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Residential Wood Combustion Study Task 1. Ambient Air Quality Impact Analysis. Appendices

Green (Del) Associates, Inc., Woodburn, OR

Prepared for

Environmental Protection Agency, Seattle, WA

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Residential Wood Combustion Study

Task 1
Appendices

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The ambient air quality impact of Residential Wood Combustion (RWC) emissions in eight Pacific Northwest cities was studied during the 1980-81 space heating season. Seventy-seven worst case fine particle ambient samples collected in Seattle, Spokane, Yakima, Tacoma and Longview, Washington; Boise, Idaho; Portland and Medford, Oregon were selected and analyzed for Polynuclear Aromatic Hydrocarbon compounds, 35 trace elements and carbon. The impact of RWC and other sources was determined by Chemical Mass Balance (CMB) calculation and validated against independent carbon-14 measurement.

This document contains the appendices for this task. The project design, methodology and results of the RWC impacts monitoring program are described in Report No. EPA 910/9-82-089a. The findings of this task form the basis for projections of future RWC impacts discussed under task 2A (EPA 910/9-82-089c) of this series. They also provide the first comprehensive survey of RWC impacts within Pacific Northwest communities during a period likely to be typical of maximum RWC emissions.

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RESIDENTIAL WOOD COMBUSTION STUDY

TASK 1

AMBIENT AIR QUALITY IMPACT ANALYSIS

APPENDICES

RESIDENTIAL WOOD COMBUSTION STUDY

TASK 1

Ambient Air Quality Impact Analysis

APPENDICES

FINAL REPORT

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THEY ARE LISTED BELOW FOR YOUR CONVENIENCE.

EPA 910/9-82-089a	Residential Wood Combustion Study Task 1 - Ambient Air Quality Impact Analysis
EPA 910/9-82-089b	Task 1 - Appendices
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EPA 910/9-82-089d	Task 2B - Household Information Survey
EPA 910/9-82-089e	Task 3 - Wood Fuel Use Projection
EPA 910/9-82-089f	Task 4 - Technical Analysis of Wood Stoves
EPA 910/9-82-089g	Task 5 - Emissions Testing of Wood Stoves Volumes 1 & 2
EPA 910/9-82-089h	Task 5 - Emissions Testing of Wood Stoves Volumes 3 & 4 (Appendices)
EPA 910/9-82-089i	Task 6 - Control Strategy Analysis
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Residential Wood Combustion Air Monitoring Network

Appendix 1

Sampling Site Descriptions

The residential sampling sites were established and operating in Portland and Spokane by Friday, January 30, 1981 and by Friday, Feb. 6, 1981 in Seattle. All three were operated through March 8-10, 1981. Background sites were operational by the following dates: (1) Portland, Carus (2-6-81); (2) Seattle, Lake Samamish State Park (3-6-81); (3) Spokane, Turnbull Wildlife Refuge (2-4-81).

The following sections describe these sites in more detail.

Portland Area Monitoring Sites

Marcus Whitman School

A temporary monitoring site was established at Marcus Whitman School, 7326 S.E. Flavel Street in Southeast Portland. Instruments were installed on the roof on a 1½ story temporary classroom - a small building near the main school building.

The small building was surrounded on three sides by open playing fields. The area around the school for blocks in all directions is residential, mostly single family housing. Some of the houses closest to the site were new and some of the newer houses frequently had wood stove installations. Wood stoves were present in some of the houses nearest the monitoring site. The nearest house with an obvious wood stove roof stack was approximately 300 feet from the building on which the instruments were mounted (to the south).

The larger school building was adjacent to the temporary classroom, and two stories in height at the corner nearest to the instruments. Thus, it was a few feet taller than the instrument heights, but not close enough to seriously obstruct air circulation. On the roof of the main school building, at the end farthest from the sampling site, was a large brick chimney, which vents exhaust from the school's heating furnace. The furnace burns distillate oil. The height of the chimney top is approximately 22 feet above ground leve. No evidence of vandalism or tampering with instruments was noted during the sampling period. No sampling at the school site was typically conducted between 5 p.m. and 5 p.m. the following day. If dichotomous filters were changed during the 24 hour sampling period, it was done early the following morning, around 8 a.m.

Carus

DEQ's Portland area background site at Carus, Oregon required only slight adaptation to serve as a background site for this study. The site already operated all three instruments used in this study. DEQ did change their dichotomous sampler filter holders from their customary larger (47 mm) filter size to accomodate the smaller (37 mm) teflon filters used in this study. DEQ field staff loaded and unloaded filters at Carus on their regular 6th day sampling schedule, using preweighed and labeled filters supplied by NEA, INC. Sampling times were adjusted to correspond to the 5 p.m. to 5 p.m. sampling regimen at the residential site in Portland.

Seattle Area Monitoring Sites

Newport Way

A temporary monitoring site was established at 13820-22 S.E. Newport Way, in Bellevue, Washington. Instruments were installed on the roof of a GMC Motor Home, which had been outfitted by the U.S. Environmental Protection Agency for air pollution monitoring. Power for the instruments was supplied directly from a nearby residence. The motor home served primarily to mount the instruments above ground level, and to provide storage and work space for the sampling technician.

The surrounding area was entirely residential, with mostly single family housing, some apartments, a school and a church were within a 1/2 mile of the site. The terrain was hilly. The monitoring site was located at the downslope end of a small valley which contained a few houses with wood stove roof stacks. This area had shown the most evidence of wood combustion activity (smoke plumes) during a January, 1981 drive-by inspection of several candidate sites in Bellevue.

The monitoring site was located downslope at the neck of the small valley to sample drainage winds from the valley. A stand of small trees at the western (further downslope) edge of the site may have slightly compromised sampler exposure from that direction. No evidence of vandalism or tampering with the instruments was noted during the study.

The nearest wood burning devices were Franklin type stoves in each of the duplex units at the site and what appeared to be similar units at similar apartments next door. No data was gathered as to whether these combustion units were used, or how often. The chimney exits serving these stoves were in high, peaked second story roofs.

The site was fully operational and the first sample taken, on Friday, February 6, 1981. Initially, and for most of the samples taken at the site, the 24 hour sampling period was begun about 7-8 a.m. Late in the field sampling period, dichotomous sampler filters were changed during the 24 hour sample to avoid the possibility of fine filter plugging if heavy impacts occurred. At this time the 24 hour sampling period was begun around 4:00-4:30 p.m. The filter change was made the next morning.

Lake Samamish

A temporary background site was established at Lake Samamish State Park and made operational just before our field sampling ended in early March. Instruments were installed on the roof of a small utility shed at the Park Ranger's residence, near several other maintenance buildings. The site was already used by DOE for ozone monitoring. The site was flat with open space in all directions with only 2 houses in the vicinity. The nearest houses had no wood stove.

The background site was established late in our field sampling period. Only three samples were taken there. Each of these, unfortunately, has some irregularity or uncertainty worth noting. The March 6-7 background sample was not picked up until several days after it was completed, due to restricted access to the site. The sample time notations appear to be erroneous on the March 6-7 and March 9-10 samples. The filters listed as being used for the March 10-11 sample appeared to be unused when logged in and weighed by NEA. Accordingly, background particulate levels attributed to this site must be interpreted with extra caution.

Spokane Area Monitoring Sites

Country Homes

A new monitoring site was established in a residential area of north Spokane, located south of Country Homes Blvd. at the intersection of Country Homes Blvd. and Wall Street. The instruments were located on the roof of a small, one-story pump station operated by the Whitworth Water District. The surrounding area is primarily single family residential. Some homes in the area, including some in the immediate vicinity of the monitoring site, had wood stove roof stacks, but the great majority did not. Most homes probably had fireplaces. Several homes nearest the monitoring site had large wood piles. No nearby objects compromised sampler exposure and no evidence of vandalism or tampering with instruments was noted.

Samples were initially started about 2 p.m. and run for 24 hours. On March 1st the dichotomous fine filter plugged with particulate. After this, filters were changed on this instrument, normally around midnight, to avoid other plugging. On at least one of these late night trips to change filters, the field technician reported strong evidence of wood burning, e.g., visible haze and noticeable odor of wood burning.

Turnbull

SCAPCA's regular background monitoring site at Turnbull Wildlife Refuge near Cheney, Washington, was adapted for our study by installing an extra high volume sampler. These instruments were mounted on the roof and on a metal balcony of a one-story frame building. This location was at least several hundred yards away from the nearest buildings.

Samples were run from 2 p.m. to 2 p.m. to correspond to urban sampling at the residential site.

Appendix 2

Source Composition Files

Tables included in Appendix 2 describe the fractional composition (weight percent) of source emissions within the fine particle mode ($\leq$ 2.5 µm) and each values associated uncertainty. The data was developed through extensive programs of source emission testing and comprehensive chemical analysis of the samples referenced in section 2.5. The uncertainty values represent 1 standard deviation values obtained through analysis of replicate source test samples.

Appendix 2

Source Emission Composition File (Fine Fraction)

```
RESWD    0001     RESIDENTIAL WOOD BURNING
          NA                   MG                   AL                   SI                   P
     0.0830   0.0460     0.0730   0.0730     0.0210   0.0200             ----                 ----
          S                    CL                   K                    CA                   TI
     0.1820   0.2000     0.5090   0.5090     0.8600   0.7000     0.0670   0.0600             ----
          V                    MN                   FE                   NI                   CU
         ----                 ----                 ----                 ----                 ----
          ZN                   AS                   BR                   SR                   CD
     0.0370   0.0370          ----                 ----                 ----                 ----
          PB                   OC                   EC
         ----           47.5000  13.8000    12.8000   8.4000

CDUST    0002     CONTINENTAL DUST  MEDFORD
          NA                   MG                   AL                   SI                   P
     1.5000   0.2000     1.9000   0.6000     9.5000   0.1000    26.6000   1.4000             ----
          S                    CL                   K                    CA                   TI
     0.0900   0.0400     0.0700   0.0500     0.9200   0.3300     1.8000   0.4000     1.0000   0.1000
          V                    MN                   FE                   NI                   CU
     0.0240   0.0050     0.1600   0.0700     5.3000   0.6000             ----        0.0300   0.0200
          ZN                   AS                   BR                   SR                   CD
     0.0090   0.0010          ----                 ----                 ----                 ----
          PB                   OC                   EC
     0.0110   0.0080     4.4000   1.7000     0.6000   0.4000
```

```
UDUST    0003     URBAN DUST  MEDFORD
          NA                  MG                    AL                    SI                    F
   2.0000    0.2000    2.0000    0.3000    8.1000    0.3000   23.8000    1.3000              ----
          S                   CL                    K                     CA                    TI
   0.4000    0.1000    0.0400    0.0100    0.9200    0.0800    2.5000    1.1000    0.6500    0.1100
          V                   MN                    FE                    NI                    CU
   0.0230    0.0060    0.1100    0.0100    4.9000    0.4000              ----      0.0400    0.0300
          ZN                  AS                    BR                    SR                    CD
   0.0500    0.0100              ----                  ----                  ----                  ----
          PB                  OC                    EC
   0.1300    0.0400   10.0000    2.0000    1.4000    0.5000


TRANSP   0004     TRANSPORTATION
          NA                  MG                    AL                    SI                    F
            ----       0.8600    0.7400    0.1400    0.1300    0.5900    0.2200              ----
          S                   CL                    K                     CA                    TI
   3.9200    4.9500    2.3500    0.7800              ----      1.1700    1.5500    0.3200    0.3700
          V                   MN                    FE                    NI                    CU
            ----                 ----      1.8500    1.7900              ----                  ----
          ZN                  AS                    BR                    SR                    CD
   0.0900    0.0900              ----      5.3200    1.8100              ----                  ----
          PB                  OC                    EC
  13.8000    2.0700   43.1200    8.6200   26.1200    9.6600
```

```
RDOIL    0005     RESID OIL
           NA                     MG                     AL                     SI                     P
    3.5000    1.7000     0.0000    3.0000     0.5300    0.2400     0.9600    0.4800               ----
           S                      CL                     K                      CA                     TI
   13.3000    2.4000     0.0000    0.1000     0.2800    0.1000     1.5800    0.6400     0.1100    0.0380
           V                      MN                     FE                     NI                     CU
    3.4400    0.7500     0.0460    0.0130     2.9700    0.6100     5.3600    1.2100     0.0750    0.0250
           ZN                     AS                     BR                     SR                     CD
    0.4000    0.1800               ----      0.0130    0.0210               ----                 ----
           PB                     OC                     EC
    0.1100    0.0640    10.1000    8.7000               ----


COUST    0006     SOIL PORTLAND
           NA                     MG                     AL                     SI                     P
    0.6900    0.3800     1.7600    0.6200    11.7000    2.2000    25.4000    3.4000               ----
           S                      CL                     K                      CA                     TI
    0.0700    0.0300     0.0000    0.0100     1.0000    0.2800     0.9300    0.3700     0.7600    0.2400
           V                      MN                     FE                     NI                     CU
    0.0250    0.0060     0.2000    0.0900     6.8000    2.3000               ----      0.0200    0.0040
           ZN                     AS                     BR                     SR                     CD
    0.0410    0.0260               ----      0.0000    0.0100               ----                 ----
           PB                     OC                     EC
    0.0060    0.0020               ----      4.9100    2.1000
```

014<

```
RDUST    0007      ROAD DUST   PORTLAND
            NA                  MG                      AL                      SI                    P
     1.2500    0.3400     1.3000    0.2700     8.8400    2.7100     22.3000    1.1000              ----
            S                   CL                      K                       CA                    TI
     0.3700    0.1400     0.0000    0.0100     1.0300    0.0600      2.4400    0.4000     0.6400    0.1200
            V                   MN                      FE                      NI                    CU
     0.0230    0.0050     0.1230    0.0170     6.0000    0.6000                ----       0.0300    0.0120
            ZN                  AS                      BR                      SR                    CD
     0.1100    0.0370             ----         0.0200    0.0056                ----                 ----
            PB                  OC                      EC
     0.3700    0.1500    13.6500    5.2100              ----


ALUMP    0011      ALUMINUM PROCESSING
            NA                  MG                      AL                      SI                    P
     4.1000    1.7000     2.8000    1.8000    27.0000    8.0000      0.3400    0.3400              ----
            S                   CL                      K                       CA                    TI
     1.4000    0.2000     1.3300    0.8400     0.2200    0.0600      0.3300    0.0300     0.0400    0.0300
            V                   MN                      FE                      NI                    CU
     0.0640    0.0360     0.0110    0.0080     0.4500    0.2900      0.1900    0.0850     0.0440    0.0070
            ZN                  AS                      BR                      SR                    CD
     0.0150    0.0110             ----         0.0370    0.0540                ----                 ----
            PB                  OC                      EC
     0.0120    0.0100     6.2000    4.9000              ----
```

```
MARINE   0015      MARINE
          NA                    MG                   AL                   SI                  P
    40.0000   4.0000     4.8000   0.9000           ----                 ----                ----
          S                     CL                   K                    CA                  TI
     3.3000   1.3000    40.0000  10.0000     1.4000   0.2000     1.4000   0.2000              ----
          V                     MN                   FE                   NI                  CU
         ----                  ----                 ----                 ----                ----
          ZN                    AS                   BR                   SR                  CD
         ----                  ----          0.2000   0.0500             ----                ----
          PB                    OC                   EC
         ----                  ----                 ----


HOGFU    0016      HOGGED FUEL BOILER  MEDFORD
          NA                    MG                   AL                   SI                  P
    14.0000   3.0000           ----          0.1300   0.0700             ----                ----
          S                     CL                   K                    CA                  TI
     3.0000   2.0000    13.0000  12.0000     9.0000   6.0000     3.0000   2.0000              ----
          V                     MN                   FE                   NI                  CU
         ----            0.2000   0.1000     0.3000   0.1000             ----         0.0270   0.0060
          ZN                    AS                   BR                   SR                  CD
     0.3000   0.1000           ----          0.0170   0.0040             ----                ----
          PB                    OC                   EC
     0.0300   0.0200     5.0000   4.0000     4.3000   4.0000
```

```
PARTD    0017       PARTICLE BOARD DRYER  MEDFORD
           NA                   MG                   AL                   SI                   P
  18.2000    1.6000            ----                 ----                 ----                 ----
           S                    CL                   K                    CA                   TI
   1.0000    0.4000   23.4000    1.9000    1.0500    0.0700    0.2000    0.0090              ----
           V                    MN                   FE                   NI                   CU
          ----         0.0200    0.0010    0.0200    0.0300              ----                 ----
           ZN                   AS                   BR                   SR                   CD
   0.0200    0.0010            ----                 ----                 ----                 ----
           PB                   OC                   EC
          ----        10.0000    5.0000    1.2000    0.3000


KRAFT    0018       KRAFT RECOVERY BOILER
           NA                   MG                   AL                   SI                   P
  12.7000    0.7100    0.6300    0.5300    0.2500    0.0140    0.1500    0.0140              ----
           S                    CL                   K                    CA                   TI
  11.7000    1.0000    1.8000    0.4200    1.5000    0.1400    0.0000    0.5000    0.0060    0.0020
           V                    MN                   FE                   NI                   CU
   0.0010    0.0010    0.0300    0.0040    1.2000    0.1100    0.1300    0.0140    0.0210    0.0130
           ZN                   AS                   BR                   SR                   CD
   0.0690    0.0210            ----        0.1300    0.0600              ----                 ----
           PB                   OC                   EC
   0.0130    0.0110    1.9200    0.4400              ----
```

```
SULFI     0019       SULFITE RECOVERY BOILER
             NA                    MG                   AL                  SI                   P
     2.5000     0.8000     0.7300     0.5200           ----         0.4000     0.1500           ----
             S                     CL                   K                   CA                   TI
    12.0000     2.0000     0.5800     0.1000   30.0000   10.0000    2.0000     0.2000    0.0100     0.0010
             V                     MN                   FE                  NI                   CU
     0.0000     0.0010     0.0540     0.0700    0.0660     0.0360    0.0000     0.0010    0.0160     0.0170
             ZN                    AS                   BR                  SR                   CD
     0.0170     0.0020             ----         0.0000     0.0050            ----                ----
             PB                    OC                   EC
     0.0000     0.0300             ----                 ----


RDUST     0020       ROAD DUST   SEATTLE
             NA                    MG                   AL                  SI                   P
            ----       1.2800     0.1088   11.1200     0.7432   27.3360     1.7800    0.3336     0.0312
             S                     CL                   K                   CA                   TI
     0.3800     0.0888     0.0248     0.0352    0.7192     0.0664    0.8640     0.0712    0.4400     0.0384
             V                     MN                   FE                  NI                   CU
     0.0392     0.0096     0.1448     0.0144    4.9896     0.3400            ----          0.0080     0.0060
             ZN                    AS                   BR                  SR                   CD
     0.0424     0.0088             ----                 ----        0.0208     0.0088    0.0392     0.0552
             PB                    OC                   EC
     0.1072     0.0224             ----                 ----
```

```
RDUST    0021      ROAD DUST   SPOKANE
          NA                    MG                      AL                      SI                      P
         ----          1.8660    0.1545      11.0100    0.7785      27.9750    1.9330       0.2992    0.0315
          S                     CL                      K                       CA                      TI
  0.3660    0.0960     0.1125    0.0465       1.3450    0.1275       0.7950    0.0705       0.4425    0.0405
          V                     MN                      FE                      NI                      CU
  0.0248    0.0090     0.2400    0.0217       5.2800    0.3750       0.0105    0.0082       0.0180    0.0075
          ZN                    AS                      BR                      SR                      CD
  0.0270    0.0077              ----                    ----           0.0135    0.0098       0.0532    0.0645
          PB                    OC                      EC
  0.1065    0.0248              ----                    ----
```

```
RDUST    0022      ROAD DUST   BOISE
          NA                    MG                      AL                      SI                      P
         ----          0.9040    0.0680       8.1600    0.4630      30.2730    1.6600       0.2430    0.0210
          S                     CL                      K                       CA                      TI
  0.5240    0.0800     0.0830    0.0300       1.7480    0.1220       1.2680    0.0810       0.4390    0.0320
          V                     MN                      FE                      NI                      CU
  0.0330    0.0070     0.0970    0.0090       3.4060    0.1990                ----          0.0070    0.0040
          ZN                    AS                      BR                      SR                      CD
  0.0810    0.0090              ----                    ----           0.0350    0.0070       0.0680    0.0400
          PB                    OC                      EC
  0.2050    0.0220              ----                    ----
```

```
DISOL    0023       DISTALLATE OIL EMISSIONS
            NA                   MG                     AL                     SI                     P
           ----                 ----             0.3100    0.2100       0.2700    0.3200             ----
            S                    CL                     K                      CA                     TI
     6.9300    2.6200     1.2000    0.9000       0.0180    0.0130       0.5000    0.5500             ----
            V                    MN                     FE                     NI                     CU
     0.0050    0.0810     0.0140    0.0100       0.1200    0.1100       0.0090    0.0055       0.1700    0.0590
            ZN                   AS                     BR                     SR                     CD
     0.0290    0.0190           ----             0.0260    0.0280              ----                  ----
            PB                   OC                     EC
     0.5400    0.5100    18.0000    5.6600      17.8000   22.9000


SECSO4   0024       SECONDARY SULFATE
            NA                   MG                     AL                     SI                     P
           ----                 ----                   ----                   ----                   ----
            S                    CL                     K                      CA                     TI
    33.0000    1.7000           ----                   ----                   ----                   ----
            V                    MN                     FE                     NI                     CU
           ----                 ----                   ----                   ----                   ----
            ZN                   AS                     BR                     SR                     CD
           ----                 ----                   ----                   ----                   ----
            PB                   OC                     EC
           ----                 ----                   ----
```

020<

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GALVN    0025      GALVANIZING - EXCESS ZINC
           NA                    MG                    AL                    SI                    P
          ----                  ----                  ----                  ----                  ----
           S                     CL                    K                     CA                    TI
          ----                  ----                  ----                  ----                  ----
           V                     MN                    FE                    NI                    CU
          ----                  ----                  ----                  ----                  ----
           ZN                    AS                    BR                    SR                    CD
    80.3000    4.0000      #    ----                  ----                  ----                  ----
           PB                    OC                    EC
          ----                  ----                  ----
```

Appendix 3

Field Program Sample Summary

Appendix 3

Field Program Sample Summary

Date	Fine Mass $(\mu g/m^3)$	24 Hour Avg. Bscat $(10^{-4} m^{-1})$	Average Wind Speed (mph)	TSP $(\mu g/m^3)$	Min. Temp. (^oF)	Day of Week	RWC Impact $(\mu g/m^3)$	Other Analysis*	Comments
Spokane (Country Homes)									
1-31-81	35	-	8.5	77	29	Sat.	32.7 ± 7.7		Probable 3rd highest impact weekend. Cold lower than average wind speeds.
2-1-81	70	-	3.5	223	25	Sun.	68.1 ± 16.0	1,2	
2-4-81	58	-	2.6	122	19	Wed.	48.9 ± 12.6		
2-6-81	83	-	5.0	153	26	Fri.	57.9 ± 13.6	1,2	
2-8-81	43	2.1	4.0	115	24	Sun.	26.2 ± 6.4		
2-9-81	31	1.2	12.1	116	9	Mon.	30.2 ± 7.4		
2-11-81	59	2.1	6.2	-	2	Tue.	19.9 ± 12.6		
2-27-81	64	2.5	4.5	149	30	Fri.	50.8 ± 12.3		Probable 2nd highest impact.
2-28-81	64	2.4	7.3	125	27	Sat.	55.8 ± 13.4		
3-2-81	69	4.2	4.6	168	26	Mon.	58.7 ± 16.2	1	
3-3-81	36	3.4	7.1	71	28	Tue.	26.4 ± 7.3		
3-6-81	33	4.4	5.9	92	21	Fri.	40.7 ± 9.9		Weekend of highest overall NEPH values. No background samples.
3-7-81	32	2.0	6.5	69	25	Sat.	23.5 ± 6.3		
3-8-81	71	3.3	4.6	136	25	Sun.	62.7 ± 15.2		
3-10-81	75	4.1	4.2	-	24	Mon.	65.3 ± 15.3		
Spokane (Turnbull)(Background)									
2-4-81	9	-	2.6	23	19	Wed.	8.3 ± 2.2		
2-6-81	6	-	5.0	-	26	Fri.	4.8 ± 3.1	1	
3-2-81	3	-	4.6	-	26	Mon.	4.8 ± 1.2		
Spokane (County Health)(Historical)									
10-30-81	53	4.2	3.7	-	32	Thurs.	34.3 ± 21.3		Air Stagnation Advisory (ASA)
Spokane (Crown Zellerbach)(Historical)									
11-17-80	41	1.5	3.3	159	27	Mon.	16.4 ± 16.6		
11-23-80	35	0.9	4.6	87	22	Sun.	16.5 ± 13.4		
12-17-80	41	2.7	3.2	-	26	Wed.	14.9 ± 12.4		
3-11-81	37	3.9	4.8	450	29	Wed.	19.1 ± 17.4		ASA

* 1 = PAH, 2 = ^{14}C

Appendix 3

Field Program Sample Summary
(Continued)

Date	Fine Mass ($\mu g/m^3$)	24 Hour Avg. Bscat ($10^{-4} m^{-1}$)	Average Wind Speed (mph)	TSP ($\mu g/m^3$)	Min. Temp. (^oF)	Day of Week	RWC Impact ($\mu g/m^3$)	Other Analysis*	Comments
Portland (Marcus Whitman School)(Residential)									
1-30-81	50	2.3	3.6	73	36	Fri.	31.7 ± 8.6		
2-2-81	26	5.1	4.4	49	34	Mon.	13.7 ± 3.9		ASA
2-5-81	35	1.0	12.7	55	37	Thurs.	17.1 ± 4.9		
2-8-81	34	5.1	6.2	51	28	Sun.	20.3 ± 5.5		
2-11-81	35	3.7	12.0	54	30	Wed.	32.4 ± 8.4		
2-23-81	36	-	-	52	-	Mon.	26.0 ± 7.4		
2-26-81	35	-	-	52	-	Thurs.	28.9 ± 7.2		
3-5-81	69	2.5	4.4	111	34	Thurs.	49.0 ± 13.6	1,2	
Portland (Carus)(Background)									
2-6-81	22	-	-	40	-	Fri.	14.7 ± 4.2	1	} Background during high impact.
2-21-81	7	-	-	-	-	Fri.	4.9 ± 1.5		
3-5-81	4	-	-	-	-	Thurs.	2.6 ± 0.9		
Medford (Courthouse)(Commercial, Historical)									
1-16-81	175	10.6	-	213	-	Fri.	62.2 ± 19.0	1	ASA
Yakima (Courthouse)(Commercial, Historical)									
11-17-80	52	-	-	148	-	Mon.	51.6 ± 32.3		
12-11-80	72	-	-	344	-	Thurs.	55.1 ± 32.4		ASA
12-19-80	49	-	-	-	-	Mon.	48.0 ± 37.7		
2-21-81	42	-	-	173	-	Sat.	45.2 ± 37.0		

* 1 = PAH, 2 = ^{14}C

Appendix 3

Field Program Sample Summary
(Continued)

Date	Fine Mass ($\mu g/m^3$)	24 Hour Avg. Bscat ($10^{-4}m^{-1}$)	Average Wind Speed (mph)	TSP ($\mu g/m^3$)	Min. Temp. (^oF)	Day of Week	RWC Impact ($\mu g/m^3$)	Other Analysis*	Comments
Seattle (Newport Way)(Residential)									
2-6-81	46	2.4	4	-	32	Fri.	37.3 ± 10.9	1,2	Third highest NEPH.
2-7-81	50	3.2	2	97	31	Sta.	48.8 ± 13.8	1,2	Highest NEPH.
2-8-81	45	2.9	4	81	31	Sun.	38.3 ± 10.8	1,2	Second highest NEPH.
2-9-81	39	1.3	6	67	32	Mon.	24.1 ± 6.8		
2-10-81	31	1.2	3	61	27	Tues.	25.0 ± 7.1		
3-1-81	34	0.8	3	78	41	Sun.	28.8 ± 8.1		
3-2-81	29	1.6	2	96	36	Mon.	22.3 ± 6.3		
3-5-81	26	0.8	4	69	37	Thurs.	29.8 ± 8.3		
3-6-81	12	0.7	4	15	34	Fri.	8.2 ± 2.6		
3-8-81	39	1.0	4	81	37	Sun.	39.2 ± 10.9		
Seattle (Lake Samamish)(Background)									
3-9-81	12	0.9	2	184	39	Mon.	9.4 ± 2.8	1	
Seattle (South Park)(Residential)									
1-15-81	112	2.2	2	235	31	Fri.	65.9 ± 19.6	1	ASA and CO Alert.
1-16-81	191	1.9	1	212	33	Sat.	68.2 ± 19.9	1	
Seattle (Georgetown)(Industrial)									
10-18-81	44	-	2	-	43	Wed.	20.4 ± 15.3		
10-4-81	38	3.1	2	-	38	Wed.	31.3 ± 21.0		
2-3-81	37	1.6	2	126	40	Tue.	35.5 ± 24.3		
Tacoma (Fire Station #12)(Industrial)									
10-4-81	51	3.1	2	65	38	Sun.			
1-16-81	39	1.9	1	180	33	Sat.			
2-3-81	45	1.6	2	174	40	Tue.			
2-9-81	53	1.3	6	217	37	Mon.			

* 1 = PAH, 2 = ^{14}C

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Appendix 3

Field Program Sample Summary
(Continued)

Date	Fine Mass ($\mu g/m^3$)	24 Hour Avg. Bscat ($10^{-4} m^{-1}$)	Average Wind Speed (mph)	TSP ($\mu g/m^3$)	Min. Temp. (^oF)	Day of Week	RWC Impact ($\mu g/m^3$)	Other Analysis*	Comments
Longview (City Shops)(Commercial)									
12-11-80	35	-	-	107	-	Thurs.	26.5 ± 20.9		
1-3-80	40	-	-	-	-	Sat.	14.2 ± 9.2		
1-10-81	60	-	-	205	-	Sat.	21.2 ± 16.9		
1-6-81	32	-	-	-	-	Fri.	40.5 ± 24.1		
Boise (Fairview & Liberty St.)(Commercial)									
12-9-80	132	-	8.2	190	8	Tue.	82.1 ± 22.9		
12-12-80	163	-	3.8	242	8	Fri.	123.2 ± 33.3	1	
1-8-81	134	-	4.0	144	29	Thurs.	78.9 ± 20.9	1	
1-18-81	196	-	4.5	196	36	Sun.	127.9 ± 29.9		
1-20-81	205^3	-	4.6	205	38	Tue.	105.0 ± 28.6		
2-7-81	82	-	5.6	100	20	Sat.	64.7 ± 17.5		
2-11-81	59^3	-	6.2	39	18	Wed.	52.1 ± 13.9		
2-13-81	89	-	8.4	80	27	Fri.	50.0 ± 13.4		
2-23-81	88	-	12.0	123	36	Mon.	77.9 ± 21.1		

* 1 = PAH, 2 = ^{14}C, 3 = Hi-vol Mass; Invalid or Questionable SSI, dichotomous mass values

Appendix 4

CMB Source Impact Summaries By Site

```
           SPOKANE COUNTRY HOMES   SITE #1
           # OF SAMPLES IN THIS SET     15

              SOURCE CONTRIBUTIONS
                     UG/M3                           PERCENT
    RESWD      44.564+-11.502      15         81.044+-20.919
    CDUST       0.000+- 0.000       0          0.000+- 0.000
    UDUST       0.000+- 0.000       0          0.000+- 0.000
    TRANSP      1.629+- 0.275      15          2.962+- 0.500
    RDOIL       0.027+- 0.012       6          0.048+- 0.021
    CDUST       0.000+- 0.000       0          0.000+- 0.000
    RDUST       0.000+- 0.000       0          0.000+- 0.000
    RDUST       0.000+- 0.000       0          0.000+- 0.000
    RDUST       1.245+- 0.149      15          2.264+- 0.271
    RDUST       0.000+- 0.000       0          0.000+- 0.000
    MARINE      0.030+- 0.013       3          0.054+- 0.024
    HOGFU       0.000+- 0.000       0          0.000+- 0.000
    PARTD       0.000+- 0.000       0          0.000+- 0.000
    ALUMP       0.205+- 0.092       8          0.373+- 0.167
    KRAFT       0.000+- 0.000       0          0.000+- 0.000
    SULFI       0.000+- 0.000       0          0.000+- 0.000
    DISOL       0.000+- 0.000       0          0.000+- 0.000
    SECSO4      1.968+- 0.515      15          3.578+- 0.937
    GALVN       0.009+- 0.005       3          0.017+- 0.008


               ELEMENTAL CONCENTRATIONS
                      UG/M3
           NA      0.085+-   0.013
           MG      0.044+-   0.033
           AL      0.213+-   0.027
           SI      0.359+-   0.042
           P       0.062+-   0.009
           S       0.806+-   0.102
           CL      0.196+-   0.029
           K       0.175+-   0.022
           CA      0.033+-   0.006
           TI      0.009+-   0.002
           V       0.003+-   0.005
           MN      0.004+-   0.006
           FE      0.067+-   0.010
           NI      0.005+-   0.007
           CU      0.041+-   0.006
           ZN      0.028+-   0.004
           AS      0.044+-   0.083
           BR      0.091+-   0.011
           CD      0.010+-   0.019
           BA      0.101+-   0.202
           PB      0.237+-   0.028
           OC     23.153+-   3.547
           EC      4.795+-   0.947

               AVERAGE MASS   55.0  UG/M3
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            SPOKANE TURNBULL   SITE #2 (BACKGROUND)
            # OF SAMPLES IN THIS SET      3

                SOURCE CONTRIBUTIONS
                       UG/M3                            PERCENT
   RESWD         6.000+- 2.264       3          90.452+-34.136
   CDUST         0.000+- 0.000       0           0.000+- 0.000
   UDUST         0.000+- 0.000       0           0.000+- 0.000
   TRANSP        0.105+- 0.023       2           1.578+- 0.347
   RDOIL         0.000+- 0.000       0           0.000+- 0.000
   CDUST         0.000+- 0.000       0           0.000+- 0.000
   RDUST         0.000+- 0.000       0           0.000+- 0.000
   RDUST         0.000+- 0.000       0           0.000+- 0.000
   RDUST         0.296+- 0.034       3           4.457+- 0.508
   RDUST         0.000+- 0.000       0           0.000+- 0.000
   MARINE        0.000+- 0.000       0           0.000+- 0.000
   HOGFU         0.000+- 0.000       0           0.000+- 0.000
   PARTD         0.000+- 0.000       0           0.000+- 0.000
   ALUMP         0.000+- 0.000       0           0.000+- 0.000
   KRAFT         0.000+- 0.000       0           0.000+- 0.000
   SULFI         0.000+- 0.000       0           0.000+- 0.000
   DISOL         0.000+- 0.000       0           0.000+- 0.000
   SECSO4        1.647+- 0.231       3          24.829+- 3.477
   GALVN         0.000+- 0.000       0           0.000+- 0.000


                ELEMENTAL CONCENTRATIONS
                       UG/M3
         NA        0.025+-   0.004
         MG        0.032+-   0.061
         AL        0.050+-   0.008
         SI        0.081+-   0.010
         P         0.028+-   0.004
         S         0.560+-   0.069
         CL        0.063+-   0.126
         K         0.034+-   0.006
         CA        0.009+-   0.002
         TI        0.004+-   0.007
         V         0.004+-   0.008
         MN        0.001+-   0.001
         FE        0.012+-   0.003
         NI        0.005+-   0.010
         CU        0.005+-   0.001
         ZN        0.013+-   0.002
         AS        0.021+-   0.040
         BR        0.007+-   0.007
         CD        0.009+-   0.018
         BA        0.059+-   0.114
         PB        0.019+-   0.004
         OC        2.163+-   0.450
         EC        0.675+-   0.200

              AVERAGE MASS    6.6  UG/M3
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          SEATTLE  NEWPORT WAY  SITE #3
          # OF SAMPLES IN THIS SET    10

             SOURCE CONTRIBUTIONS
                    UG/M3                            PERCENT
   RESWD     30.244+- 8.592     10        83.872+-23.826
   CDUST      0.000+- 0.000      0         0.000+- 0.000
   UDUST      0.000+- 0.000      0         0.000+- 0.000
   TRANSP     2.105+- 0.357     10         5.838+- 0.991
   RDOIL      0.068+- 0.025     10         0.189+- 0.070
   CDUST      0.000+- 0.000      0         0.000+- 0.000
   RDUST      0.000+- 0.000      0         0.000+- 0.000
   RDUST      0.684+- 0.082     10         1.897+- 0.228
   RDUST      0.000+- 0.000      0         0.000+- 0.000
   RDUST      0.000+- 0.000      0         0.000+- 0.000
   MARINE     0.383+- 0.087     10         1.062+- 0.241
   HOGFU      0.000+- 0.000      0         0.000+- 0.000
   PARTD      0.000+- 0.000      0         0.000+- 0.000
   ALUMP      0.000+- 0.000      0         0.000+- 0.000
   KRAFT      0.000+- 0.000      0         0.000+- 0.000
   SULFI      0.000+- 0.000      0         0.000+- 0.000
   DISOL      0.000+- 0.000      0         0.000+- 0.000
   SECSO4     2.551+- 0.560     10         7.074+- 1.553
   GALVN      0.048+- 0.013      6         0.132+- 0.035


             ELEMENTAL CONCENTRATIONS
                    UG/M3
          NA      0.182+-   0.026
          MG      0.024+-   0.029
          AL      0.115+-   0.017
          SI      0.182+-   0.022
          P       0.064+-   0.008
          S       1.004+-   0.123
          CL      0.084+-   0.039
          K       0.205+-   0.025
          CA      0.024+-   0.005
          TI      0.005+-   0.002
          V       0.004+-   0.004
          MN      0.004+-   0.001
          FE      0.064+-   0.009
          NI      0.004+-   0.001
          CU      0.007+-   0.004
          ZN      0.055+-   0.007
          AS      0.056+-   0.098
          BR      0.087+-   0.010
          CD      0.012+-   0.025
          BA      0.067+-   0.119
          PB      0.324+-   0.038
          OC     14.322+-   2.421
          EC      5.710+-   1.201

               AVERAGE MASS   36.1  UG/M3
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```
                SEATTLE  LAKE SAMANISH  SITE #4 (BACKGROUND)
                # OF SAMPLES IN THIS SET      1

                   SOURCE CONTRIBUTIONS
                         UG/M3                              PERCENT
           RESWD       9.431+- 2.836       1        77.303+-23.246
           CDUST       0.000+- 0.000       0         0.000+- 0.000
           UDUST       0.000+- 0.000       0         0.000+- 0.000
           TRANSP      1.160+- 0.197       1         9.508+- 1.615
           RDOIL       0.042+- 0.017       1         0.344+- 0.139
           CDUST       0.000+- 0.000       0         0.000+- 0.000
           RDUST       0.000+- 0.000       0         0.000+- 0.000
           RDUST       0.870+- 0.089       1         7.131+- 0.730
           RDUST       0.000+- 0.000       0         0.000+- 0.000
           RDUST       0.000+- 0.000       0         0.000+- 0.000
           MARINE      0.346+- 0.065       1         2.836+- 0.533
           HOGFU       0.000+- 0.000       0         0.000+- 0.000
           PARTD       0.000+- 0.000       0         0.000+- 0.000
           ALUMP       0.000+- 0.000       0         0.000+- 0.000
           KRAFT       0.000+- 0.000       0         0.000+- 0.000
           SULFI       0.000+- 0.000       0         0.000+- 0.000
           DISOL       0.000+- 0.000       0         0.000+- 0.000
           SECSO4      1.822+- 0.328       1        14.934+- 2.689
           GALVN       0.000+- 0.000       0         0.000+- 0.000


                   ELEMENTAL CONCENTRATIONS
                         UG/M3
                NA      0.148+-   0.021
                MG      0.019+-   0.007
                AL      0.110+-   0.015
                SI      0.235+-   0.027
                P       0.041+-   0.006
                S       0.684+-   0.084
                CL      0.079+-   0.159
                K       0.084+-   0.011
                CA      0.024+-   0.004
                TI      0.005+-   0.001
                V       0.001+-   0.001
                MN      0.003+-   0.001
                FE      0.064+-   0.009
                NI      0.003+-   0.001
                CU      0.009+-   0.002
                ZN      0.021+-   0.003
                AS      0.031+-   0.007
                BR      0.047+-   0.006
                CD      0.002+-   0.001
                BA      0.093+-   0.186
                PB      0.179+-   0.021
                OC      4.170+-   0.870
                EC      2.980+-   0.630

                     AVERAGE MASS   12.2  UG/M3
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          PORTLAND  MARCUS WHITMAN  SITE #5
          # OF SAMPLES IN THIS SET      8

              SOURCE CONTRIBUTIONS
                     UG/M3                          PERCENT
RESWD        27.428+- 7.497      8         68.144+-18.627
CDUST         0.000+- 0.000      0          0.000+- 0.000
UDUST         0.000+- 0.000      0          0.000+- 0.000
TRANSP        1.642+- 0.277      8          4.080+- 0.688
RDOIL         0.252+- 0.061      7          0.627+- 0.153
CDUST         0.000+- 0.000      0          0.000+- 0.000
RDUST         0.706+- 0.094      8          1.753+- 0.235
RDUST         0.000+- 0.000      0          0.000+- 0.000
RDUST         0.000+- 0.000      0          0.000+- 0.000
RDUST         0.000+- 0.000      0          0.000+- 0.000
MARINE        0.268+- 0.069      7          0.666+- 0.173
HOGFU         0.000+- 0.000      0          0.000+- 0.000
PARTD         0.000+- 0.000      0          0.000+- 0.000
ALUMP         0.115+- 0.055      4          0.287+- 0.136
KRAFT         0.000+- 0.000      0          0.000+- 0.000
SULFI         0.000+- 0.000      0          0.000+- 0.000
DISOL         0.000+- 0.000      0          0.000+- 0.000
SECSO4        2.486+- 0.506      8          6.176+- 1.258
GALVN         0.023+- 0.011      6          0.057+- 0.028


              ELEMENTAL CONCENTRATIONS
                     UG/M3
          NA       0.154+-   0.022
          MG       0.052+-   0.078
          AL       0.125+-   0.017
          SI       0.169+-   0.020
          P        0.065+-   0.008
          S        0.981+-   0.118
          CL       0.274+-   0.041
          K        0.252+-   0.030
          CA       0.030+-   0.005
          TI       0.005+-   0.002
          V        0.009+-   0.002
          MN       0.006+-   0.004
          FE       0.061+-   0.008
          NI       0.016+-   0.006
          CU       0.021+-   0.003
          ZN       0.035+-   0.005
          AS       0.043+-   0.082
          BR       0.089+-   0.010
          CD       0.013+-   0.025
          BA       0.070+-   0.135
          PB       0.239+-   0.028
          OC      13.205+-   2.141
          EC       4.230+-   0.884

               AVERAGE MASS   40.2  UG/M3
          PORTLAND  CARUS  SITE #6 (BACKGROUND)
          # OF SAMPLES IN THIS SET      3

               SOURCE CONTRIBUTIONS
                          UG/M3                              PERCENT
   RESWD        7.465+- 2.198        3         66.457+-19.564
   CDUST        0.000+- 0.000        0          0.000+- 0.000
   UDUST        0.000+- 0.000        0          0.000+- 0.000
   TRANSP       0.311+- 0.058        3          2.766+- 0.519
   RDOIL        0.037+- 0.009        1          0.332+- 0.080
   CDUST        0.221+- 0.039        3          1.964+- 0.344
   RDUST        0.000+- 0.000        0          0.000+- 0.000
   RDUST        0.000+- 0.000        0          0.000+- 0.000
   RDUST        0.000+- 0.000        0          0.000+- 0.000
   RDUST        0.000+- 0.000        0          0.000+- 0.000
   MARINE       0.417+- 0.077        3          3.712+- 0.682
   HOGFU        0.000+- 0.000        0          0.000+- 0.000
   PARTD        0.000+- 0.000        0          0.000+- 0.000
   ALUMP        0.054+- 0.027        1          0.484+- 0.237
   KRAFT        0.000+- 0.000        0          0.000+- 0.000
   SULFI        0.000+- 0.000        0          0.000+- 0.000
   DISOL        0.000+- 0.000        0          0.000+- 0.000
   SECSO4       1.406+- 0.219        3         12.513+- 1.950
   GALVN        0.008+- 0.004        2          0.071+- 0.033


               ELEMENTAL CONCENTRATIONS
                      UG/M3
        NA      0.182+-   0.026
        MG      0.042+-   0.061
        AL      0.048+-   0.008
        SI      0.059+-   0.008
        P       0.027+-   0.004
        S       0.509+-   0.064
        CL      0.070+-   0.013
        K       0.078+-   0.011
        CA      0.011+-   0.002
        TI      0.004+-   0.007
        V       0.004+-   0.005
        MN      0.003+-   0.001
        FE      0.016+-   0.003
        NI      0.008+-   0.012
        CU      0.017+-   0.003
        ZN      0.010+-   0.002
        AS      0.025+-   0.049
        BR      0.015+-   0.002
        CD      0.009+-   0.018
        BA      0.089+-   0.179
        PB      0.046+-   0.007
        OC      3.253+-   0.663
        EC      1.570+-   0.370

              AVERAGE MASS   11.2  UG/M3
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         MEDFORD  COURTHOUSE  SITE #7
         # OF SAMPLES IN THIS SET      2

            SOURCE CONTRIBUTIONS
                  UG/M3                                PERCENT
RESWD       57.673+-18.906       2          20.372+- 6.678
CDUST        0.000+- 0.000       0           0.000+- 0.000
UDUST        1.768+- 0.264       2           0.625+- 0.093
TRANSP       4.674+- 0.793       2           1.651+- 0.280
RDOIL        0.242+- 0.087       2           0.086+- 0.031
CDUST        0.000+- 0.000       0           0.000+- 0.000
RDUST        0.000+- 0.000       0           0.000+- 0.000
RDUST        0.000+- 0.000       0           0.000+- 0.000
RDUST        0.000+- 0.000       0           0.000+- 0.000
RDUST        0.000+- 0.000       0           0.000+- 0.000
MARINE       0.000+- 0.000       0           0.000+- 0.000
HOGFU       37.466+- 6.815       2          13.234+- 2.407
PARTD        0.000+- 0.000       0           0.000+- 0.000
ALUMP        0.000+- 0.000       0           0.000+- 0.000
KRAFT        0.000+- 0.000       0           0.000+- 0.000
SULFI        0.000+- 0.000       0           0.000+- 0.000
DISOL        0.000+- 0.000       0           0.000+- 0.000
SECSO4       1.424+- 0.546       1           0.503+- 0.193
GALVN        0.000+- 0.000       0           0.000+- 0.000


            ELEMENTAL CONCENTRATIONS
                  UG/M3
      NA      6.229+-   0.987
      MG      0.197+-   0.041
      AL      0.137+-   0.044
      SI      0.496+-   0.065
      P       0.157+-   0.028
      S       2.336+-   0.285
      CL      3.233+-   0.376
      K       2.988+-   0.340
      CA      0.337+-   0.045
      TI      0.037+-   0.054
      V       0.015+-   0.004
      MN      0.051+-   0.008
      FE      0.276+-   0.035
      NI      0.007+-   0.004
      CU      0.043+-   0.008
      ZN      0.199+-   0.024
      AS      0.189+-   0.379
      BR      0.238+-   0.028
      CD      0.089+-   0.178
      BA      0.509+-   1.018
      PB      0.672+-   0.081
      OC     24.865+-   5.480
      EC     20.110+-   4.150

           AVERAGE MASS  283.1  UG/M3
```

```
          SEATTLE  SOUTH PARK DALLAS  SITE #8
          # OF SAMPLES IN THIS SET      2

             SOURCE CONTRIBUTIONS
                    UG/M3                               PERCENT
   RESWD       67.114+-19.816        2          65.863+-19.447
   CDUST        0.000+- 0.000        0           0.000+- 0.000
   UDUST        0.000+- 0.000        0           0.000+- 0.000
   TRANSP      13.674+- 2.561        2          13.419+- 2.514
   RDOIL        1.000+- 0.281        2           0.982+- 0.276
   CDUST        0.000+- 0.000        0           0.000+- 0.000
   RDUST        0.000+- 0.000        0           0.000+- 0.000
   RDUST        0.218+- 0.182        1           0.214+- 0.179
   RDUST        0.000+- 0.000        0           0.000+- 0.000
   RDUST        0.000+- 0.000        0           0.000+- 0.000
   MARINE       1.730+- 0.389        2           1.698+- 0.382
   HOGFU        0.000+- 0.000        0           0.000+- 0.000
   PARTD        0.000+- 0.000        0           0.000+- 0.000
   ALUMP        0.000+- 0.000        0           0.000+- 0.000
   KRAFT        0.000+- 0.000        0           0.000+- 0.000
   SULFI        0.000+- 0.000        0           0.000+- 0.000
   DISOL        0.000+- 0.000        0           0.000+- 0.000
   SECSO4       3.410+- 1.227        1           3.346+- 1.204
   GALVN        0.082+- 0.025        1           0.080+- 0.025


             ELEMENTAL CONCENTRATIONS
                    UG/M3
          NA      0.879+-  0.146
          MG      0.977+-  0.424
          AL      0.162+-  0.324
          SI      0.124+-  0.097
          P       0.148+-  0.072
          S       3.645+-  0.520
          CL      0.808+-  0.151
          K       0.631+-  0.092
          CA      0.095+-  0.026
          TI      0.024+-  0.012
          V       0.023+-  0.011
          MN      0.055+-  0.014
          FE      0.682+-  0.095
          NI      0.069+-  0.018
          CU      0.064+-  0.017
          ZN      0.201+-  0.031
          AS      0.036+-  0.072
          BR     15.789+-  1.771
          CD      0.011+-  0.022
          BA      0.125+-  0.122
          PB      1.865+-  0.226
          OC     43.875+-  6.430
          EC      9.200+-  1.900

              AVERAGE MASS  101.9  UG/M3
```

```
        SEATTLE-TACOMA  FIRE STATION #12  SITE #9
        # OF SAMPLES IN THIS SET      4

           SOURCE CONTRIBUTIONS
                   UG/M3                                PERCENT
  RESWD      35.239+-25.855        4          74.977+-55.010
  CDUST       0.000+- 0.000        0           0.000+- 0.000
  UDUST       0.000+- 0.000        0           0.000+- 0.000
  TRANSP      2.893+- 0.476        4           6.155+- 1.013
  RDOIL       0.400+- 0.082        4           0.852+- 0.174
  CDUST       0.000+- 0.000        0           0.000+- 0.000
  RDUST       0.000+- 0.000        0           0.000+- 0.000
  RDUST       0.885+- 0.129        4           1.883+- 0.274
  RDUST       0.000+- 0.000        0           0.000+- 0.000
  RDUST       0.000+- 0.000        0           0.000+- 0.000
  MARINE      1.012+- 0.225        4           2.154+- 0.480
  HOGFU       0.000+- 0.000        0           0.000+- 0.000
  PARTD       0.000+- 0.000        0           0.000+- 0.000
  ALUMP       0.902+- 0.331        4           1.919+- 0.704
  KRAFT       0.000+- 0.000        0           0.000+- 0.000
  SULFI       0.000+- 0.000        0           0.000+- 0.000
  DISOL       0.000+- 0.000        0           0.000+- 0.000
  SECSO4      4.243+- 0.823        4           9.029+- 1.752
  GALVN       0.049+- 0.023        4           0.104+- 0.048


           ELEMENTAL CONCENTRATIONS
                  UG/M3
        NA      0.504+-  0.072
        MG      0.121+-  0.182
        AL      0.356+-  0.043
        SI      0.255+-  0.030
        P       0.102+-  0.012
        S       1.680+-  0.197
        CL      0.549+-  0.067
        K       0.398+-  0.047
        CA      0.054+-  0.008
        TI      0.010+-  0.002
        V       0.015+-  0.002
        MN      0.012+-  0.002
        FE      0.303+-  0.036
        NI      0.023+-  0.003
        CU      0.015+-  0.002
        ZN      0.057+-  0.007
        AS      0.056+-  0.047
        BR      0.136+-  0.016
        CD      0.006+-  0.008
        BA      0.102+-  0.204
        PB      0.397+-  0.046
        OC     -1.000+- -1.000
        EC     -1.000+- -1.000

           AVERAGE MASS   47.0  UG/M3
```

```
          SEATTLE-GEORGETOWN  SITE #10
          # OF SAMPLES IN THIS SET      3

             SOURCE CONTRIBUTIONS
                    UG/M3                             PERCENT
  RESWD       29.109+-20.254       3          73.384+-51.061
  CDUST        0.000+- 0.000       0           0.000+- 0.000
  UDUST        0.000+- 0.000       0           0.000+- 0.000
  TRANSP       4.071+- 0.673       3          10.264+- 1.696
  RDOIL        0.355+- 0.071       3           0.895+- 0.178
  CDUST        0.000+- 0.000       0           0.000+- 0.000
  RDUST        0.000+- 0.000       0           0.000+- 0.000
  RDUST        0.858+- 0.115       3           2.163+- 0.289
  RDUST        0.000+- 0.000       0           0.000+- 0.000
  RDUST        0.000+- 0.000       0           0.000+- 0.000
  MARINE       0.532+- 0.126       3           1.342+- 0.318
  HOGFU        0.000+- 0.000       0           0.000+- 0.000
  PARTD        0.000+- 0.000       0           0.000+- 0.000
  ALUMP        0.220+- 0.090       2           0.555+- 0.226
  KRAFT        0.000+- 0.000       0           0.000+- 0.000
  SULFI        0.000+- 0.000       0           0.000+- 0.000
  DISOL        0.000+- 0.000       0           0.000+- 0.000
  SECSO4       3.857+- 0.838       3           9.724+- 2.238
  GALVN        0.085+- 0.022       3           0.213+- 0.056


             ELEMENTAL CONCENTRATIONS
                    UG/M3
        NA      0.263+-  0.038
        MG      0.239+-  0.478
        AL      0.175+-  0.023
        SI      0.254+-  0.029
        P       0.104+-  0.012
        S       1.556+-  0.183
        CL      0.473+-  0.059
        K       0.269+-  0.032
        CA      0.057+-  0.008
        TI      0.011+-  0.002
        V       0.012+-  0.002
        MN      0.026+-  0.004
        FE      0.202+-  0.024
        NI      0.021+-  0.003
        CU      0.011+-  0.002
        ZN      0.084+-  0.010
        AS      0.103+-  0.206
        BR      0.225+-  0.026
        CD      0.002+-  0.001
        BA      0.097+-  0.195
        PB      0.583+-  0.067
        OC     -1.000+- -1.000
        EC     -1.000+- -1.000

              AVERAGE MASS   39.7  UG/M3
        YAKIMA COUNTY COURTHOUSE  SITE #11
        # OF SAMPLES IN THIS SET      4

           SOURCE CONTRIBUTIONS
                 UG/M3                             PERCENT
RESWD      50.021+-34.910       4         93.063+-64.949
CDUST       0.000+- 0.000       0          0.000+- 0.000
UDUST       0.000+- 0.000       0          0.000+- 0.000
TRANSP      2.418+- 0.402       4          4.499+- 0.749
RDOIL       0.035+- 0.018       3          0.066+- 0.034
CDUST       0.000+- 0.000       0          0.000+- 0.000
RDUST       0.000+- 0.000       0          0.000+- 0.000
RDUST       0.000+- 0.000       0          0.000+- 0.000
RDUST       1.652+- 0.177       4          3.074+- 0.330
RDUST       0.000+- 0.000       0          0.000+- 0.000
MARINE      0.000+- 0.000       0          0.000+- 0.000
HOGFU       0.000+- 0.000       0          0.000+- 0.000
PARTD       0.000+- 0.000       0          0.000+- 0.000
ALUMP       0.000+- 0.000       0          0.000+- 0.000
KRAFT       0.000+- 0.000       0          0.000+- 0.000
SULFI       0.000+- 0.000       0          0.000+- 0.000
DISOL       0.000+- 0.000       0          0.000+- 0.000
SECSO4      2.865+- 0.679       4          5.330+- 1.264
GALYN       0.000+- 0.000       0          0.000+- 0.000


           ELEMENTAL CONCENTRATIONS
                 UG/M3
     NA      0.148+-  0.022
     MG      0.035+-  0.015
     AL      0.212+-  0.026
     SI      0.478+-  0.054
     P       0.088+-  0.010
     S       1.142+-  0.136
     CL      0.587+-  0.070
     K       0.291+-  0.034
     CA      0.076+-  0.010
     TI      0.013+-  0.002
     V       0.005+-  0.008
     MN      0.005+-  0.001
     FE      0.113+-  0.014
     NI      0.004+-  0.005
     CU      0.007+-  0.001
     ZN      0.080+-  0.010
     AS      0.083+-  0.165
     BR      0.120+-  0.014
     CD      0.003+-  0.001
     BA      0.098+-  0.197
     PB      0.343+-  0.040
     OC     -1.000+- -1.000
     EC     -1.000+- -1.000

            AVERAGE MASS   53.8  UG/M3
```

```
          LONGVIEW CITY SHOPS BUILDING  SITE #12
          # OF SAMPLES IN THIS SET      4

              SOURCE CONTRIBUTIONS
                       UG/M3                                PERCENT
RESWD         25.627+-17.836        4          61.383+-42.722
CDUST          0.000+- 0.000        0           0.000+- 0.000
UDUST          0.000+- 0.000        0           0.000+- 0.000
TRANSP         1.424+- 0.246        4           3.412+- 0.589
RDOIL          0.465+- 0.094        4           1.115+- 0.225
CDUST          0.000+- 0.000        0           0.000+- 0.000
RDUST          0.756+- 0.113        4           1.811+- 0.270
RDUST          0.000+- 0.000        0           0.000+- 0.000
RDUST          0.000+- 0.000        0           0.000+- 0.000
RDUST          0.000+- 0.000        0           0.000+- 0.000
MARINE         0.000+- 0.000        0           0.000+- 0.000
HOGFU          0.000+- 0.000        0           0.000+- 0.000
PARTD          0.000+- 0.000        0           0.000+- 0.000
ALUMP          0.457+- 0.198        4           1.094+- 0.474
KRAFT          4.034+- 0.766        4           9.663+- 1.835
SULFI          0.000+- 0.000        0           0.000+- 0.000
DISOL          0.000+- 0.000        0           0.000+- 0.000
SECSO4         2.464+- 0.675        4           5.902+- 1.618
GALVN          0.040+- 0.016        4           0.096+- 0.040


              ELEMENTAL CONCENTRATIONS
                       UG/M3
          NA       0.679+-   0.097
          MG       0.157+-   0.245
          AL       0.211+-   0.026
          SI       0.203+-   0.023
          P        0.091+-   0.011
          S        1.458+-   0.171
          CL       0.615+-   0.073
          K        0.265+-   0.032
          CA       0.054+-   0.007
          TI       0.006+-   0.001
          V        0.019+-   0.002
          MN       0.013+-   0.002
          FE       0.089+-   0.011
          NI       0.030+-   0.004
          CU       0.064+-   0.008
          ZN       0.048+-   0.006
          AS       0.066+-   0.132
          BR       0.072+-   0.008
          CD       0.004+-   0.007
          BA       0.067+-   0.130
          PB       0.225+-   0.026
          OC      -1.000+-  -1.000
          EC      -1.000+-  -1.000

               AVERAGE MASS   41.8  UG/M3
          SPOKANE COUNTY HALL BUILDING  SITE #13
          # OF SAMPLES IN THIS SET      1

              SOURCE CONTRIBUTIONS
                     UG/M3                            PERCENT
   RESWD      34.371+-21.346        1        64.729+-40.200
   CDUST        0.000+- 0.000       0          0.000+- 0.000
   UDUST        0.000+- 0.000       0          0.000+- 0.000
   TRANSP       2.956+- 0.486       1          5.567+- 0.915
   RDOIL        0.032+- 0.030       1          0.060+- 0.056
   CDUST        0.000+- 0.000       0          0.000+- 0.000
   RDUST        0.000+- 0.000       0          0.000+- 0.000
   RDUST        0.000+- 0.000       0          0.000+- 0.000
   RDUST        0.890+- 0.131       1          1.676+- 0.247
   RDUST        0.000+- 0.000       0          0.000+- 0.000
   MARINE       0.000+- 0.000       0          0.000+- 0.000
   HOGFU        0.000+- 0.000       0          0.000+- 0.000
   PARTD        0.000+- 0.000       0          0.000+- 0.000
   ALUMP        0.721+- 0.263       1          1.358+- 0.495
   KRAFT        0.000+- 0.000       0          0.000+- 0.000
   SULFI        0.000+- 0.000       0          0.000+- 0.000
   DISOL        0.000+- 0.000       0          0.000+- 0.000
   SECSO4       2.683+- 0.656       1          5.053+- 1.235
   GALVN        0.073+- 0.022       1          0.137+- 0.041

              ELEMENTAL CONCENTRATIONS
                     UG/M3
         NA      0.186+-   0.027
         MG      0.031+-   0.012
         AL      0.304+-   0.036
         SI      0.272+-   0.031
         P       0.078+-   0.010
         S       1.082+-   0.130
         CL      0.383+-   0.048
         K       0.242+-   0.029
         CA      0.030+-   0.005
         TI      0.002+-   0.001
         V       0.002+-   0.001
         MN      0.004+-   0.001
         FE      0.104+-   0.013
         NI      0.009+-   0.019
         CU      0.012+-   0.002
         ZN      0.075+-   0.009
         AS      0.091+-   0.182
         BR      0.164+-   0.019
         CD      0.001+-   0.001
         BA      0.025+-   0.009
         PB      0.421+-   0.048
         OC     -1.000+-  -1.000
         EC     -1.000+-  -1.000

              AVERAGE MASS   53.1  UG/M3
```

```
        SPOKANE CROWN  SITE #14
        # OF SAMPLES IN THIS SET      4

            SOURCE CONTRIBUTIONS
                                                    PERCENT
                   UG/M3
RESWD       16.761+-14.953        4        45.300+-40.414
CDUST        0.000+- 0.000        0         0.000+- 0.000
UDUST        0.000+- 0.000        0         0.000+- 0.000
TRANSP       1.735+- 0.291        4         4.689+- 0.787
RDOIL        0.017+- 0.009        2         0.047+- 0.024
CDUST        0.000+- 0.000        0         0.000+- 0.000
RDUST        0.000+- 0.000        0         0.000+- 0.000
RDUST        0.000+- 0.000        0         0.000+- 0.000
RDUST        1.231+- 0.137        4         3.328+- 0.371
RDUST        0.000+- 0.000        0         0.000+- 0.000
MARINE       0.000+- 0.000        0         0.000+- 0.000
HOGFU        0.721+- 0.228        3         1.948+- 0.617
PARTD        0.000+- 0.000        0         0.000+- 0.000
ALUMP        0.482+- 0.173        3         1.303+- 0.468
KRAFT        0.000+- 0.000        0         0.000+- 0.000
SULFI        0.000+- 0.000        0         0.000+- 0.000
DISOL        0.000+- 0.000        0         0.000+- 0.000
SECSO4       2.750+- 0.506        4         7.433+- 1.368
GALVN        0.041+- 0.012        4         0.112+- 0.034


            ELEMENTAL CONCENTRATIONS
                   UG/M3
      NA       0.186+-   0.027
      MG       0.090+-   0.125
      AL       0.258+-   0.031
      SI       0.353+-   0.041
      P        0.073+-   0.009
      S        1.041+-   0.124
      CL       0.427+-   0.052
      K        0.213+-   0.026
      CA       0.067+-   0.009
      TI       0.007+-   0.001
      V        0.002+-   0.001
      MN       0.006+-   0.001
      FE       0.118+-   0.015
      NI       0.004+-   0.006
      CU       0.020+-   0.003
      ZN       0.043+-   0.005
      AS       0.070+-   0.140
      BR       0.076+-   0.009
      CD       0.016+-   0.031
      BA       0.057+-   0.097
      PB       0.252+-   0.029
      OC      -1.000+-  -1.000
      EC      -1.000+-  -1.000

            AVERAGE MASS   37.0  UG/M3
```

```
          SPOKANE - TURNBULL  SITE #15
          # OF SAMPLES IN THIS SET      2

             SOURCE CONTRIBUTIONS
                   UG/M3                          PERCENT
RESWD        8.214+- 5.240      2         56.652+-36.138
CDUST        0.000+- 0.000      0          0.000+- 0.000
UDUST        0.000+- 0.000      0          0.000+- 0.000
TRANSP       0.429+- 0.080      2          2.962+- 0.552
RDOIL        0.000+- 0.000      0          0.000+- 0.000
CDUST        0.000+- 0.000      0          0.000+- 0.000
RDUST        0.000+- 0.000      0          0.000+- 0.000
RDUST        0.000+- 0.000      0          0.000+- 0.000
RDUST        0.351+- 0.050      2          2.421+- 0.348
RDUST        0.000+- 0.000      0          0.000+- 0.000
MARINE       0.000+- 0.000      0          0.000+- 0.000
HOGFU        0.000+- 0.000      0          0.000+- 0.000
PARTD        0.000+- 0.000      0          0.000+- 0.000
ALUMP        0.146+- 0.066      2          1.007+- 0.455
KRAFT        0.000+- 0.000      0          0.000+- 0.000
SULFI        0.000+- 0.000      0          0.000+- 0.000
DISOL        0.000+- 0.000      0          0.000+- 0.000
SECSO4       1.905+- 0.285      2         13.141+- 1.969
GALVN        0.000+- 0.000      0          0.000+- 0.000


             ELEMENTAL CONCENTRATIONS
                   UG/M3
          NA      0.046+-   0.007
          MG      0.016+-   0.006
          AL      0.081+-   0.011
          SI      0.109+-   0.013
          P       0.033+-   0.004
          S       0.663+-   0.081
          CL      0.070+-   0.071
          K       0.080+-   0.010
          CA      0.011+-   0.002
          TI      0.002+-   0.001
          V       0.007+-   0.013
          MN      0.005+-   0.009
          FE      0.021+-   0.004
          NI      0.008+-   0.017
          CU      0.005+-   0.001
          ZN      0.034+-   0.004
          AS      0.030+-   0.054
          BR      0.012+-   0.002
          CD      0.008+-   0.014
          BA      0.020+-   0.008
          PB      0.074+-   0.009
          OC     -1.000+-  -1.000
          EC     -1.000+-  -1.000

               AVERAGE MASS   14.5  UG/M3
```

```
            BOISE  FAIRVIEW & LIBERTY STREETS  SITE #16
            # OF SAMPLES IN THIS SET      9

                SOURCE CONTRIBUTIONS
                      UG/M3                             PERCENT
     RESWD      84.532+-22.383        9         79.881+-21.152
     CDUST       0.000+- 0.000        0          0.000+- 0.000
     UDUST       0.000+- 0.000        0          0.000+- 0.000
     TRANSP      3.927+- 0.628        9          3.711+- 0.593
     RDOIL       0.016+- 0.007        2          0.015+- 0.007
     CDUST       0.000+- 0.000        0          0.000+- 0.000
     RDUST       0.000+- 0.000        0          0.000+- 0.000
     RDUST       0.000+- 0.000        0          0.000+- 0.000
     RDUST       0.000+- 0.000        0          0.000+- 0.000
     RDUST      17.975+- 1.211        9         16.986+- 1.144
     MARINE      0.964+- 0.201        8          0.911+- 0.190
     HOGFU       0.000+- 0.000        0          0.000+- 0.000
     PARTD       0.000+- 0.000        0          0.000+- 0.000
     ALUMP       0.000+- 0.000        0          0.000+- 0.000
     KRAFT       0.000+- 0.000        0          0.000+- 0.000
     SULFI       0.000+- 0.000        0          0.000+- 0.000
     DISOL       0.000+- 0.000        0          0.000+- 0.000
     SECSO4      3.771+- 1.010        9          3.564+- 0.955
     GALVN       0.000+- 0.000        0          0.000+- 0.000


                ELEMENTAL CONCENTRATIONS
                      UG/M3
            NA      0.492+-   0.063
            MG      0.219+-   0.086
            AL      1.596+-   0.163
            SI      5.576+-   0.595
            P       0.161+-   0.015
            S       1.680+-   0.168
            CL      0.327+-   0.037
            K       0.556+-   0.052
            CA      0.458+-   0.050
            TI      0.094+-   0.059
            V       0.014+-   0.028
            MN      0.016+-   0.005
            FE      0.626+-   0.068
            NI      0.008+-   0.013
            CU      0.017+-   0.006
            ZN      0.054+-   0.006
            AS      0.089+-   0.178
            BR      0.220+-   0.021
            CD      0.014+-   0.023
            BA      0.119+-   0.238
            PB      0.588+-   0.055
            OC     50.968+-   7.784
            EC      9.706+-   2.009

                AVERAGE MASS  105.8  UG/M3
```

Appendix 5

CMB Source Apportionment
Calculation
Fine Particle Fraction

```
CMBDEQ RESULTS FOR CMB # 010004
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 131   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.689 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG     UG/M3               %
 ------------------------------------------------------------------------------
  1   RESWD    *  32.735+- 7.744   92.273+-23.732
  4   TRANS    *   0.861+- 0.145    2.427+- 0.477
  9   RDUST    *   0.770+- 0.083    2.170+- 0.321
 18   SECSO    *   1.740+- 0.358    4.905+- 1.124
 ------------------------------------------------------------------------------
      TOTAL:      36.106+- 7.754  101.775+-24.150

 SPECIE     FIT            FINE  SUSPENDED PARTICULATE
 CODE       FLG     MEAS. UG/M3          PERCENT        CALC. UG/M3       RATIO
 ------------------------------------------------------------------------------
   1  NA      *      0.059+- 0.009   0.166+- 0.030    0.027+- 0.015  0.461+-0.281  NA
   2  MG             0.019+- 0.007   0.054+- 0.022    0.046+- 0.025  2.379+-3.327  MG
   3  AL      *      0.108+- 0.015   0.303+- 0.051    0.093+- 0.009  0.863+-0.110  AL
   4  SI      *      0.210+- 0.025   0.591+- 0.091    0.220+- 0.015  1.051+-0.104  SI
   5  P              0.049+- 0.006   0.139+- 0.023    0.002+- 0.000  0.047+-0.008  P
   6  S       *      0.670+- 0.082   1.890+- 0.300    0.670+- 0.084  1.000+-0.176  S
   7  CL      *      0.131+- 0.020   0.369+- 0.067    0.188+- 0.167  1.433+-2.224  CL
   8  K       *      0.123+- 0.016   0.346+- 0.056    0.293+- 0.229  2.387+-4.826  K
   9  CA             0.015+- 0.003   0.041+- 0.010    0.038+- 0.024  2.611+-4.549  CA
  10  TI      *      0.005+- 0.001   0.013+- 0.004    0.006+- 0.003  1.340+-1.169  TI
  11  V              0.001+- 0.001   0.003+- 0.002    0.000+- 0.000  0.174+-0.309  V
  12  MN             0.001+- 0.001   0.003+- 0.002    0.002+- 0.000  1.848+-0.773  MN
  13  FE      *      0.049+- 0.007   0.138+- 0.025    0.057+- 0.016  1.157+-0.490  FE
  14  NI             0.001+- 0.001   0.004+- 0.003    0.000+- 0.000  0.062+-0.257  NI
  15  CU             0.040+- 0.005   0.113+- 0.019    0.000+- 0.000  0.003+-0.008  CU
  16  ZN      *      0.015+- 0.002   0.043+- 0.008    0.013+- 0.012  0.856+-1.044  ZN
  17  AS             0.005+- 0.005   0.015+- 0.014    0.000+- 0.000  0.000+-0.061  AS
  18  BR      *      0.052+- 0.006   0.147+- 0.023    0.046+- 0.016  0.877+-0.397  BR
  19  SR                   < 0.028         < 0.078    0.000+- 0.000  0.000+-0.000  SR
  20  CD                   < 0.205         < 0.579    0.000+- 0.001  0.000+-0.000  CD
  21  PB      *      0.119+- 0.015   0.335+- 0.054    0.120+- 0.018  1.005+-0.212  PB
  22  OC      *     14.600+- 2.170  41.154+- 7.393   15.920+- 4.518  1.090+-0.458  OC
  23  EC      *      2.160+- 0.470   6.089+- 1.460    4.415+- 2.751  2.044+-2.898  EC
 ------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  35.5+- 3.6
```

```
CMBDEQ RESULTS FOR CMB # 010006
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  21   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.484 DEGREES OF FREEDOM: 10
 CODE SOURCE FLG      UG/M3               %
 ------------------------------------------------------------------------------------------
  1   RESWD    *  68.119+-16.076   97.312+-24.951
  4   TRANS    *   1.565+- 0.260    2.236+- 0.434
  9   RDUST    *   0.972+- 0.111    1.388+- 0.211
 18   SECSO    *   1.603+- 0.559    2.290+- 0.831
 ------------------------------------------------------------------------------------------
      TOTAL:      72.258+-16.089  103.226+-25.205

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3        PERCENT          CALC. UG/M3         RATIO
 ------------------------------------------------------------------------------------------
   1  NA      *      0.055+- 0.010   0.078+- 0.016    0.057+- 0.031  1.034+-0.824  NA
   2  MG      *      0.075+- 0.024   0.108+- 0.036    0.081+- 0.051  1.078+-0.996  MG
   3  AL      *      0.157+- 0.020   0.224+- 0.036    0.123+- 0.016  0.788+-0.128  AL
   4  SI      *      0.263+- 0.031   0.376+- 0.058    0.281+- 0.019  1.067+-0.106  SI
   5  P              0.063+- 0.008   0.090+- 0.015    0.003+- 0.001  0.046+-0.012  P
   6  S       *      0.718+- 0.088   1.026+- 0.163    0.718+- 0.159  1.000+-0.313  S
   7  CL      *      0.210+- 0.028   0.300+- 0.050    0.385+- 0.347  1.833+-3.453  CL
   8  K       *      0.196+- 0.024   0.281+- 0.044    0.601+- 0.477  3.059+-7.814  K.
   9  CA             0.025+- 0.005   0.035+- 0.007    0.072+- 0.048  2.890+-5.862  CA
  10  TI      *      0.010+- 0.002   0.014+- 0.003    0.009+- 0.006  0.931+-0.798  TI
  11  V                   <  0.012         <  0.017    0.000+- 0.001  0.000+-0.000  V
  12  MN             0.001+- 0.001   0.001+- 0.001    0.002+- 0.001  2.591+-2.201  MN
  13  FE      *      0.046+- 0.007   0.066+- 0.012    0.080+- 0.028  1.737+-1.226  FE
  14  NI                  <  0.015         <  0.021    0.000+- 0.001  0.000+-0.000  NI
  15  CU             0.022+- 0.003   0.031+- 0.006    0.000+- 0.001  0.008+-0.031  CU
  16  ZN      *      0.017+- 0.003   0.025+- 0.005    0.027+- 0.025  1.545+-2.669  ZN
  17  AS                  <  0.132         <  0.188    0.000+- 0.001  0.000+-0.000  AS
  18  BR      *      0.094+- 0.011   0.134+- 0.021    0.083+- 0.028  0.887+-0.403  BR
  19  SR                  <  0.030         <  0.043    0.000+- 0.001  0.000+-0.000  SR
  20  CD                  <  0.229         <  0.327    0.001+- 0.001  0.000+-0.000  CD
  21  PB      *      0.218+- 0.026   0.312+- 0.048    0.217+- 0.032  0.993+-0.209  PB
  22  OC      *     36.620+- 5.830  52.314+- 9.841   33.031+- 9.401  0.902+-0.346  OC
  23  EC      *     11.670+- 2.410  16.671+- 3.827    9.128+- 5.724  0.782+-0.623  EC
 ------------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  70.0+- 7.0
```

046<

```
                                        PAGE 0003


CMBDER RESULTS FOR CMB # 010010
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  24   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 24 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.803 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG      UG/M3                 %
 ---------------------------------------------------------------------------------
  1   RESWD   *  48.985+-12.264   84.766+-22.863
  4   TRANS   *   1.603+- 0.270    2.773+- 0.544
  9   RDUST   *   1.311+- 0.167    2.269+- 0.368
 14   ALUMP   *   0.549+- 0.215    0.949+- 0.384
 18   SECSO   *   5.663+- 0.862    9.800+- 1.786
 19   GALVN   *   0.053+- 0.025    0.092+- 0.045
 ---------------------------------------------------------------------------------
      TOTAL:      58.164+-12.300  100.651+-23.558

 SPECIE      FIT           FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT        CALC. UG/M3        RATIO
 ---------------------------------------------------------------------------------
   1  NA      *       0.125+- 0.018   0.216+- 0.039     0.063+- 0.024  0.506+-0.219  NA
   2  MG                    < 0.308          < 0.533     0.089+- 0.039  0.000+-0.000  MG
   3  AL      *       0.274+- 0.033   0.475+- 0.074     0.305+- 0.046  1.112+-0.252  AL
   4  SI      *       0.395+- 0.045   0.684+- 0.104     0.378+- 0.026  0.956+-0.090  SI
   5  P               0.101+- 0.012   0.175+- 0.027     0.004+- 0.001  0.039+-0.006  P
   6  S       *       2.033+- 0.235   3.519+- 0.538     2.033+- 0.159  1.000+-0.110  S
   7  CL      *       0.135+- 0.022   0.234+- 0.044     0.296+- 0.250  2.191+-4.454  CL
   8  K       *       0.196+- 0.024   0.340+- 0.054     0.443+- 0.343  2.254+-4.306  K
   9  CA      *       0.037+- 0.006   0.064+- 0.012     0.064+- 0.038  1.729+-2.084  CA
  10  TI      *       0.010+- 0.002   0.018+- 0.004     0.011+- 0.006  1.093+-0.868  TI
  11  V                     < 0.014          < 0.024     0.001+- 0.001  0.000+-0.000  V
  12  MN      *       0.004+- 0.001   0.007+- 0.002     0.003+- 0.001  0.844+-0.197  MN
  13  FE      *       0.073+- 0.010   0.127+- 0.021     0.101+- 0.029  1.381+-0.677  FE
  14  NI                    < 0.018          < 0.031     0.001+- 0.001  0.000+-0.000  NI
  15  CU              0.040+- 0.005   0.070+- 0.012     0.000+- 0.001  0.012+-0.012  CU
  16  ZN      *       0.063+- 0.008   0.109+- 0.017     0.063+- 0.018  1.000+-0.413  ZN
  17  AS                    < 0.138          < 0.239     0.000+- 0.000  0.000+-0.000  AS
  18  BR      *       0.080+- 0.009   0.139+- 0.022     0.085+- 0.029  1.063+-0.527  BR
  19  SR                    < 0.028          < 0.049     0.000+- 0.001  0.000+-0.000  SR
  20  CD                    < 0.248          < 0.429     0.001+- 0.001  0.000+-0.000  CD
  21  PB      *       0.239+- 0.028   0.413+- 0.064     0.223+- 0.033  0.933+-0.190  PB
  22  OC      *      24.010+- 3.670  41.548+- 7.596    23.993+- 6.761  0.999+-0.398  OC
  23  EC      *       5.340+- 1.110   9.241+- 2.133     6.689+- 4.118  1.253+-1.236  EC
 ---------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  57.8+- 5.8
```

```
CMBDEQ RESULTS FOR CMB # 010012
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  26   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 24 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.502 DEGREES OF FREEDOM: 10
 CODE SOURCE FLG     UG/M3                 %
 ------------------------------------------------------------------------------------------
  1   RESWD   *  57.938+-13.621   69.681+-17.806
  4   TRANS   *   2.006+- 0.334    2.413+- 0.469
  9   RDUST   *   1.529+- 0.161    1.839+- 0.267
 18   SECSO   *   2.855+- 0.639    3.434+- 0.842
 ------------------------------------------------------------------------------------------
      TOTAL:     64.328+-13.641   77.366+-18.143

 SPECIE     FIT           FINE  SUSPENDED PARTICULATE
 CODE       FLG     MEAS. UG/M3        PERCENT         CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------------
   1  NA      *      0.074+- 0.011   0.089+- 0.016    0.048+- 0.027  0.647+-0.427  NA
   2  MG             0.033+- 0.011   0.040+- 0.014    0.088+- 0.045  2.653+-3.833  MG
   3  AL      *      0.217+- 0.027   0.261+- 0.042    0.183+- 0.017  0.844+-0.101  AL
   4  SI      *      0.417+- 0.048   0.502+- 0.076    0.440+- 0.030  1.054+-0.104  SI
   5  P              0.082+- 0.010   0.099+- 0.016    0.005+- 0.001  0.056+-0.009  P
   6  S       *      1.132+- 0.135   1.361+- 0.212    1.132+- 0.160  1.000+-0.200  S
   7  CL      *      0.311+- 0.040   0.375+- 0.061    0.344+- 0.295  1.104+-1.412  CL
   8  K       *      0.267+- 0.032   0.321+- 0.050    0.522+- 0.406  1.955+-3.335  K
   9  CA      *      0.041+- 0.006   0.050+- 0.009    0.074+- 0.047  1.803+-2.328  CA
  10  TI      *      0.011+- 0.002   0.013+- 0.003    0.013+- 0.007  1.244+-1.125  TI
  11  V              0.001+- 0.001   0.002+- 0.001    0.000+- 0.001  0.253+-0.410  V
  12  MN             0.002+- 0.001   0.003+- 0.001    0.004+- 0.001  1.468+-0.475  MN
  13  FE      *      0.078+- 0.010   0.094+- 0.016    0.118+- 0.036  1.505+-0.839  FE
  14  NI                   < 0.020         < 0.025    0.000+- 0.001  0.000+-0.000  NI
  15  CU             0.044+- 0.006   0.054+- 0.009    0.000+- 0.001  0.006+-0.013  CU
  16  ZN      *      0.031+- 0.004   0.037+- 0.006    0.024+- 0.022  0.761+-0.869  ZN
  17  AS             0.019+- 0.007   0.022+- 0.009    0.000+- 0.001  0.000+-0.031  AS
  18  BR      *      0.119+- 0.014   0.144+- 0.022    0.107+- 0.036  0.893+-0.407  BR
  19  SR                   < 0.033         < 0.039    0.000+- 0.001  0.000+-0.000  SR
  20  CD                   < 0.206         < 0.248    0.001+- 0.001  0.000+-0.000  CD
  21  PB      *      0.287+- 0.033   0.346+- 0.053    0.278+- 0.042  0.969+-0.201  PB
  22  OC      *     23.940+- 4.260  28.792+- 5.879   28.386+- 7.997  1.186+-0.518  OC
  23  EC      *     10.870+- 2.250  13.073+- 3.006    7.940+- 4.871  0.730+-0.555  EC
 ------------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  83.1+- 8.3
```

```
                                   PAGE 0005


CMBDEQ RESULTS FOR CMB # 010016
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  28   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 24 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.820 DEGREES OF FREEDOM: 10
 CODE SOURCE FLG     UG/M3                %
 ------------------------------------------------------------------------------------
  1    RESWD   *  26.289+- 6.386   60.711+-15.960
  4    TRANS   *   0.644+- 0.113    1.487+- 0.301
  5    RDOIL   *   0.017+- 0.014    0.039+- 0.033
  9    RDUST   *   0.633+- 0.091    1.462+- 0.257
 14    ALUMP   *   0.266+- 0.110    0.614+- 0.261
 18    SECSO   *   4.003+- 0.570    9.243+- 1.611
 ------------------------------------------------------------------------------------
       TOTAL:     31.852+- 6.414   73.556+-16.555

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3         PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA      *      0.046+- 0.007   0.106+- 0.019      0.033+- 0.013  0.724+-0.347  NA
   2  MG             0.024+- 0.008   0.055+- 0.019      0.044+- 0.020  1.833+-1.773  MG
   3  AL      *      0.142+- 0.018   0.329+- 0.053      0.148+- 0.022  1.040+-0.228  AL
   4  SI      *      0.211+- 0.025   0.488+- 0.075      0.182+- 0.012  0.861+-0.077  SI
   5  P              0.069+- 0.009   0.159+- 0.025      0.002+- 0.000  0.028+-0.005  P
   6  S       *      1.402+- 0.164   3.238+- 0.499      1.402+- 0.092  1.000+-0.092  S
   7  CL      *      0.077+- 0.015   0.178+- 0.038      0.153+- 0.134  1.990+-3.873  CL
   8  K       *      0.111+- 0.014   0.255+- 0.042      0.237+- 0.184  2.138+-3.928  K
   9  CA      *      0.020+- 0.004   0.046+- 0.010      0.031+- 0.019  1.582+-1.765  CA
  10  TI      *      0.003+- 0.001   0.006+- 0.002      0.005+- 0.002  1.918+-2.007  TI
  11  V       *      0.001+- 0.001   0.002+- 0.001      0.001+- 0.000  1.128+-0.593  V
  12  MN             0.001+- 0.001   0.003+- 0.002      0.002+- 0.000  1.297+-0.410  MN
  13  FE      *      0.023+- 0.004   0.052+- 0.011      0.047+- 0.012  2.081+-1.205  FE
  14  NI      *      0.002+- 0.001   0.004+- 0.002      0.001+- 0.000  0.864+-0.316  NI
  15  CU             0.028+- 0.004   0.065+- 0.011      0.000+- 0.000  0.009+-0.010  CU
  16  ZN      *      0.013+- 0.002   0.029+- 0.006      0.011+- 0.010  0.833+-0.999  ZN
  17  AS                   < 0.094         < 0.218      0.000+- 0.000  0.000+-0.000  AS
  18  BR      *      0.036+- 0.004   0.083+- 0.013      0.034+- 0.012  0.957+-0.450  BR
  19  SR                   < 0.029         < 0.068      0.000+- 0.000  0.000+-0.000  SR
  20  CD                   < 0.214         < 0.494      0.000+- 0.000  0.000+-0.000  CD
  21  PB      *      0.098+- 0.012   0.227+- 0.037      0.090+- 0.013  0.910+-0.183  PB
  22  OC      *     12.700+- 2.100  29.328+- 5.676     12.783+- 3.628  1.007+-0.405  OC
  23  EC      *      4.490+- 0.940  10.369+- 2.408      3.533+- 2.209  0.787+-0.626  EC
 ------------------------------------------------------------------------------------
MEAS  AMB. MASS (UG/M3):  FINE:  43.3+- 4.4
```

```
CMBDEQ RESULTS FOR CMB # 010018
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  29   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.650 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG      UG/M3                 %
 ----------------------------------------------------------------------------------
  1    RESWD   *  30.251+- 7.430   98.535+-26.175
  4    TRANS   *   0.994+- 0.168    3.239+- 0.638
  5    RDOIL   *   0.127+- 0.043    0.415+- 0.148
  9    RDUST   *   0.739+- 0.104    2.408+- 0.416
 14    ALUMP   *   0.390+- 0.146    1.272+- 0.493
 18    SECSO   *   1.557+- 0.348    5.073+- 1.243
 ----------------------------------------------------------------------------------
       TOTAL:     34.060+- 7.443  110.942+-26.714

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------
   1  NA       *      0.079+- 0.011   0.257+- 0.046     0.046+- 0.016  0.579+-0.228  NA
   2  MG              0.020+- 0.009   0.065+- 0.030     0.055+- 0.025  2.782+-3.661  MG
   3  AL       *      0.176+- 0.022   0.573+- 0.092     0.195+- 0.032  1.109+-0.275  AL
   4  SI       *      0.226+- 0.026   0.736+- 0.114     0.215+- 0.015  0.952+-0.089  SI
   5  P               0.044+- 0.006   0.145+- 0.024     0.002+- 0.000  0.050+-0.009  P
   6  S        *      0.633+- 0.078   2.062+- 0.329     0.633+- 0.082  1.000+-0.184  S
   7  CL       *      0.069+- 0.013   0.225+- 0.049     0.183+- 0.154  2.654+-6.329  CL
   8  K        *      0.100+- 0.013   0.327+- 0.054     0.273+- 0.212  2.720+-6.118  K
   9  CA       *      0.022+- 0.004   0.072+- 0.015     0.041+- 0.024  1.851+-2.258  CA
  10  TI       *      0.007+- 0.002   0.023+- 0.006     0.007+- 0.004  0.951+-0.720  TI
  11  V        *      0.005+- 0.001   0.015+- 0.004     0.005+- 0.001  1.024+-0.309  V
  12  MN              0.003+- 0.001   0.011+- 0.004     0.002+- 0.000  0.536+-0.112  MN
  13  FE       *      0.050+- 0.007   0.164+- 0.029     0.063+- 0.018  1.249+-0.574  FE
  14  NI                  <   0.017         <   0.054   0.008+- 0.002  0.000+-0.000  NI
  15  CU              0.024+- 0.003   0.078+- 0.014     0.000+- 0.000  0.017+-0.013  CU
  16  ZN       *      0.015+- 0.002   0.050+- 0.009     0.013+- 0.011  0.840+-0.959  ZN
  17  AS                  <   0.110         <   0.358   0.000+- 0.000  0.000+-0.000  AS
  18  BR       *      0.054+- 0.006   0.175+- 0.028     0.053+- 0.018  0.990+-0.473  BR
  19  SR              0.002+- 0.001   0.008+- 0.005     0.000+- 0.000  0.040+-0.125  SR
  20  CD                  <   0.216         <   0.703   0.000+- 0.001  0.000+-0.000  CD
  21  PB       *      0.143+- 0.017   0.466+- 0.074     0.138+- 0.021  0.967+-0.200  PB
  22  OC       *     15.820+- 2.390  51.529+- 9.369    14.835+- 4.176  0.938+-0.362  OC
  23  EC       *      3.110+- 0.660  10.130+- 2.381     4.132+- 2.543  1.329+-1.360  EC
 ----------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  30.7+- 3.1
```

```
CMBDEQ RESULTS FOR CMB # 010020
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 211   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.529 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                 %
 ----------------------------------------------------------------------------------
   1   RESWD   *  19.923+-12.611   33.816+-21.672
   4   TRANS   *   2.255+- 0.380    3.827+- 0.751
   9   RDUST   *   2.196+- 0.200    3.727+- 0.505
  18   SECSO   *   1.772+- 0.465    3.008+- 0.846
  19   GALVN   *   0.044+- 0.014    0.075+- 0.024
 ----------------------------------------------------------------------------------
       TOTAL:     26.189+-12.627   44.452+-21.891

 SPECIE     FIT            FINE  SUSPENDED PARTICULATE
 CODE       FLG     MEAS. UG/M3          PERCENT         CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------
   1  NA            0.120+- 0.017   0.204+- 0.036    0.017+- 0.009  0.137+-0.077  NA
   2  MG            0.037+- 0.011   0.063+- 0.020    0.075+- 0.022  2.003+-1.340  MG
   3  AL        *   0.278+- 0.033   0.472+- 0.074    0.249+- 0.018  0.895+-0.086  AL
   4  SI        *   0.601+- 0.068   1.020+- 0.155    0.628+- 0.043  1.044+-0.103  SI
   5  P             0.065+- 0.008   0.111+- 0.018    0.007+- 0.001  0.101+-0.011  P
   6  S         *   0.717+- 0.089   1.218+- 0.194    0.717+- 0.122  1.000+-0.241  S
   7  CL        *   0.181+- 0.025   0.307+- 0.053    0.157+- 0.103  0.868+-0.754  CL
   8  K         *   0.193+- 0.024   0.328+- 0.052    0.205+- 0.139  1.064+-1.055  K
   9  CA        *   0.040+- 0.006   0.068+- 0.013    0.057+- 0.037  1.437+-1.626  CA
  10  TI        *   0.014+- 0.002   0.024+- 0.005    0.017+- 0.008  1.201+-0.930  TI
  11  V             0.001+- 0.001   0.002+- 0.001    0.001+- 0.000  0.545+-0.321  V
  12  MN        *   0.006+- 0.001   0.011+- 0.002    0.005+- 0.001  0.850+-0.109  MN
  13  FE        *   0.101+- 0.013   0.172+- 0.028    0.158+- 0.041  1.555+-0.751  FE
  14  NI                  <  0.018         <  0.031    0.000+- 0.000  0.000+-0.000  NI
  15  CU            0.032+- 0.004   0.055+- 0.009    0.000+- 0.000  0.012+-0.008  CU
  16  ZN        *   0.046+- 0.006   0.077+- 0.013    0.046+- 0.008  1.000+-0.243  ZN
  17  AS                  <  0.164         <  0.279    0.000+- 0.000  0.000+-0.000  AS
  18  BR        *   0.105+- 0.012   0.178+- 0.027    0.120+- 0.041  1.142+-0.590  BR
  19  SR            0.002+- 0.002   0.001+- 0.003    0.000+- 0.000  0.185+-0.187  SR
  20  CD                  <  0.226         <  0.384    0.001+- 0.001  0.000+-0.000  CD
  21  PB        *   0.350+- 0.040   0.595+- 0.091    0.313+- 0.047  0.895+-0.179  PB
  22  OC           -1.000+--1.000  -1.000+--1.000   10.435+- 2.756  0.895+-0.000  OC
  23  EC           -1.000+--1.000  -1.000+--1.000    3.139+- 1.688  0.895+-0.000  EC
 ----------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  58.9+- 5.9
```

```
CMBDEQ RESULTS FOR CMB # 010030
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 227   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 24 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.457 DEGREES OF FREEDOM: 10
 CODE SOURCE FLG     UG/M3              %
 -----------------------------------------------------------------------------------
  1   RESWD   *  50.871+-12.318   79.647+-20.874
  4   TRANS   *   2.972+- 0.492    4.654+- 0.901
  9   RDUST   *   1.569+- 0.168    2.456+- 0.360
 18   SECSO   *   1.022+- 0.593    1.600+- 0.943
 -----------------------------------------------------------------------------------
      TOTAL:     56.434+-12.343   88.356+-21.259

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3         RATIO
 -----------------------------------------------------------------------------------
   1  NA       *      0.056+- 0.009   0.087+- 0.017     0.042+- 0.023  0.757+-0.526  NA
   2  MG              0.033+- 0.014   0.052+- 0.023     0.092+- 0.043  2.770+-3.835  MG
   3  AL       *      0.206+- 0.026   0.323+- 0.052     0.188+- 0.016  0.909+-0.107  AL
   4  SI       *      0.446+- 0.051   0.699+- 0.106     0.456+- 0.031  1.022+-0.100  SI
   5  P               0.054+- 0.007   0.084+- 0.014     0.005+- 0.001  0.087+-0.013  P
   6  S        *      0.552+- 0.072   0.864+- 0.142     0.552+- 0.180  1.000+-0.460  S
   7  CL       *      0.188+- 0.026   0.295+- 0.051     0.331+- 0.260  1.755+-2.789  CL
   8  K        *      0.170+- 0.021   0.266+- 0.042     0.462+- 0.356  2.716+-6.063  K
   9  CA       *      0.038+- 0.006   0.060+- 0.011     0.081+- 0.055  2.129+-3.404  CA
  10  TI       *      0.012+- 0.002   0.020+- 0.004     0.016+- 0.011  1.316+-1.458  TI
  11  V               0.001+- 0.001   0.001+- 0.001     0.000+- 0.001  0.486+-0.735  V
  12  MN              0.001+- 0.001   0.002+- 0.001     0.004+- 0.001  2.510+-1.104  MN
  13  FE       *      0.074+- 0.010   0.116+- 0.020     0.138+- 0.054  1.860+-1.525  FE
  14  NI              0.001+- 0.001   0.002+- 0.002     0.000+- 0.001  0.137+-0.442  NI
  15  CU              0.048+- 0.006   0.076+- 0.012     0.000+- 0.001  0.006+-0.011  CU
  16  ZN       *      0.025+- 0.004   0.040+- 0.007     0.022+- 0.019  0.860+-0.983  ZN
  17  AS                    <  0.183          <  0.287     0.000+- 0.001  0.000+-0.000  AS
  18  BR       *      0.176+- 0.020   0.276+- 0.042     0.158+- 0.054  0.897+-0.410  BR
  19  SR                    <  0.032          <  0.050     0.000+- 0.001  0.000+-0.000  SR
  20  CD                    <  0.228          <  0.357     0.001+- 0.001  0.000+-0.000  CD
  21  PB       *      0.431+- 0.049   0.674+- 0.103     0.412+- 0.062  0.956+-0.198  PB
  22  OC       *     30.170+- 4.660  47.236+- 8.698    25.445+- 7.025  0.843+-0.305  OC
  23  EC       *      4.840+- 1.010   7.578+- 1.754     7.288+- 4.283  1.506+-1.599  EC
 -----------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  63.9+- 6.4
```

```
CMBDEQ.RESULTS FOR CMB # 010038
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 228   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.561 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG     UG/M3                 %
 ------------------------------------------------------------------------------------
  1    RESWD   *  55.844+-13.480   87.534+-22.880
  4    TRANS   *   2.028+- 0.339    3.180+- 0.619
  9    RDUST   *   1.347+- 0.188    2.111+- 0.363
 14    ALUMP   *   0.339+- 0.175    0.531+- 0.279
 18    SECSO   *   0.804+- 0.499    1.261+- 0.793
 ------------------------------------------------------------------------------------
       TOTAL:     60.362+-13.496   94.617+-23.184

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA      *      0.100+- 0.015   0.157+- 0.028     0.060+- 0.026  0.601+-0.307  NA
   2  MG             0.027+- 0.010   0.042+- 0.017     0.093+- 0.044  3.464+-5.908  MG
   3  AL      *      0.243+- 0.029   0.381+- 0.060     0.254+- 0.031  1.047+-0.186  AL
   4  SI      *      0.415+- 0.047   0.651+- 0.099     0.390+- 0.026  0.939+-0.087  SI
   5  P              0.059+- 0.008   0.093+- 0.015     0.004+- 0.001  0.068+-0.012  P
   6  S       *      0.456+- 0.061   0.715+- 0.119     0.456+- 0.151  1.000+-0.468  S
   7  CL      *      0.281+- 0.036   0.440+- 0.072     0.338+- 0.285  1.203+-1.586  CL
   8  K       *      0.218+- 0.026   0.341+- 0.054     0.502+- 0.391  2.306+-4.516  K
   9  CA      *      0.026+- 0.005   0.041+- 0.009     0.073+- 0.046  2.785+-5.191  CA
  10  TI      *      0.010+- 0.002   0.015+- 0.003     0.013+- 0.008  1.311+-1.296  TI
  11  V                    <  0.013         <  0.021   0.001+- 0.001  0.000+-0.000  V
  12  MN             0.002+- 0.001   0.003+- 0.001     0.003+- 0.001  2.044+-0.898  MN
  13  FE      *      0.074+- 0.010   0.116+- 0.020     0.110+- 0.037  1.487+-0.887  FE
  14  NI             0.001+- 0.001   0.002+- 0.002     0.001+- 0.001  0.561+-0.523  NI
  15  CU             0.054+- 0.007   0.084+- 0.014     0.000+- 0.001  0.007+-0.011  CU
  16  ZN      *      0.025+- 0.004   0.039+- 0.007     0.023+- 0.021  0.916+-1.125  ZN
  17  AS                   <  0.153         <  0.240   0.000+- 0.001  0.000+-0.000  AS
  18  BR      *      0.113+- 0.013   0.177+- 0.027     0.108+- 0.037  0.954+-0.448  BR
  19  SR                   <  0.031         <  0.048   0.000+- 0.001  0.000+-0.000  SR
  20  CD                   <  0.239         <  0.375   0.001+- 0.001  0.000+-0.000  CD
  21  PB      *      0.296+- 0.034   0.464+- 0.071     0.281+- 0.042  0.951+-0.196  PB
  22  OC      *     29.050+- 4.480  45.536+- 8.376    27.421+- 7.708  0.944+-0.365  OC
  23  EC      *      5.400+- 1.120   8.464+- 1.950     7.678+- 4.695  1.422+-1.511  EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  63.8+- 6.4
```

```
CMBDEQ RESULTS FOR CMB # 010044
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  32   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 14
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.313 DEGREES OF FREEDOM:  8
 CODE SOURCE FLG      UG/M3              %
 ------------------------------------------------------------------------------
  1    RESWD    *  58.760+-16.238   85.323+-25.101
  4    TRANS    *   2.402+- 0.402    3.489+- 0.682
  9    RDUST    *   1.859+- 0.241    2.700+- 0.444
 11    MARIN    *   0.161+- 0.096    0.233+- 0.141
 14    ALUMP    *   0.421+- 0.236    0.611+- 0.348
 18    SECSO    *   1.859+- 0.621    2.699+- 0.942
 19    GALVN    *   0.044+- 0.030    0.065+- 0.044
 ------------------------------------------------------------------------------
       TOTAL:      65.507+-16.258   95.119+-25.485

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG       MEAS. UG/M3          PERCENT          CALC. UG/M3         RATIO
 ------------------------------------------------------------------------------
   1   NA       *       0.128+- 0.019    0.186+- 0.034     0.130+- 0.029   1.014+-0.318   NA
   2   MG               0.051+- 0.019    0.074+- 0.029     0.118+- 0.047   2.309+-2.326   MG
   3   AL       *       0.335+- 0.042    0.487+- 0.079     0.334+- 0.039   0.996+-0.162   AL
   4   SI       *       0.545+- 0.063    0.792+- 0.122     0.536+- 0.036   0.982+-0.094   SI
   5   P                0.086+- 0.012    0.125+- 0.021     0.006+- 0.001   0.065+-0.010   P
   6   S        *       0.833+- 0.110    1.209+- 0.201     0.833+- 0.170   1.000+-0.289   S
   7   CL       *       0.623+- 0.079    0.904+- 0.147     0.427+- 0.300   0.686+-0.584   CL
   8   K        *       0.253+- 0.032    0.368+- 0.060     0.537+- 0.411   2.121+-3.808   K
   9   CA       *       0.047+- 0.009    0.069+- 0.014     0.086+- 0.051   1.820+-2.257   CA
  10   TI       *       0.013+- 0.003    0.019+- 0.005     0.016+- 0.009   1.209+-1.055   TI
  11   V                0.002+- 0.001    0.003+- 0.002     0.001+- 0.001   0.332+-0.302   V
  12   MN       *       0.005+- 0.002    0.007+- 0.003     0.005+- 0.001   0.920+-0.198   MN
  13   FE       *       0.123+- 0.017    0.179+- 0.031     0.145+- 0.044   1.171+-0.544   FE
  14   NI                     <  0.007          <  0.010   0.001+- 0.001   0.622+-0.519   NI
  15   CU               0.055+- 0.008    0.081+- 0.014     0.001+- 0.001   0.009+-0.011   CU
  16   ZN       *       0.060+- 0.008    0.087+- 0.015     0.060+- 0.022   1.000+-0.515   ZN
  17   AS                     <  0.050          <  0.073   0.000+- 0.001   0.000+-0.083   AS
  18   BR       *       0.135+- 0.016    0.196+- 0.031     0.128+- 0.043   0.951+-0.445   BR
  19   SR                     <  0.029          <  0.043   0.000+- 0.001   0.000+-0.000   SR
  20   CD                     <  0.222          <  0.323   0.001+- 0.001   0.000+-0.000   CD
  21   PB       *       0.340+- 0.041    0.494+- 0.077     0.334+- 0.050   0.980+-0.205   PB
  22   OC       *      34.870+- 5.340   50.633+- 9.287    28.973+- 8.112   0.831+-0.302   OC
  23   EC       *       5.230+- 1.090    7.594+- 1.759     8.149+- 4.941   1.558+-1.749   EC
 ------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  68.9+- 7.0
```

```
CMBDEQ RESULTS FOR CMB # 010050
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  33   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 14
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.819 DEGREES OF FREEDOM:  8
 CODE SOURCE FLG      UG/M3                  %
 ------------------------------------------------------------------------------------
  1   RESWD   *  26.414+- 7.354   73.561+-21.848
  4   TRANS   *   1.261+- 0.218    3.511+- 0.707
  5   RDOIL   *   0.082+- 0.034    0.228+- 0.097
  9   RDUST   *   1.191+- 0.129    3.316+- 0.497
 11   MARIN   *   0.149+- 0.050    0.415+- 0.146
 18   SECSO   *   1.365+- 0.356    3.801+- 1.066
 ------------------------------------------------------------------------------------
      TOTAL:     30.461+- 7.368   84.832+-22.314

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA      *      0.087+- 0.013   0.243+- 0.045    0.084+- 0.014  0.967+-0.217  NA
   2  MG             0.036+- 0.013   0.101+- 0.038    0.059+- 0.022  1.643+-1.152  MG
   3  AL      *      0.184+- 0.026   0.513+- 0.089    0.139+- 0.011  0.753+-0.073  AL
   4  SI      *      0.317+- 0.038   0.883+- 0.140    0.341+- 0.023  1.076+-0.107  SI
   5  P              0.048+- 0.008   0.135+- 0.026    0.004+- 0.000  0.074+-0.010  P
   6  S       *      0.568+- 0.079   1.582+- 0.275    0.568+- 0.085  1.000+-0.212  S
   7  CL      *      0.096+- 0.020   0.268+- 0.062    0.225+- 0.136  2.339+-3.586  CL
   8  K       *      0.144+- 0.020   0.401+- 0.069    0.248+- 0.185  1.720+-2.553  K
   9  CA      *      0.036+- 0.007   0.101+- 0.022    0.045+- 0.025  1.255+-1.119  CA
  10  TI      *      0.007+- 0.002   0.021+- 0.007    0.009+- 0.005  1.269+-1.026  TI
  11  V                    <  0.012         <  0.034  0.003+- 0.001  0.000+-0.000  V
  12  MN                   <  0.018         <  0.050  0.003+- 0.000  0.000+-0.000  MN
  13  FE      *      0.058+- 0.010   0.162+- 0.032    0.089+- 0.023  1.528+-0.724  FE
  14  NI      *      0.005+- 0.001   0.013+- 0.004    0.005+- 0.001  0.983+-0.314  NI
  15  CU             0.039+- 0.006   0.110+- 0.020    0.000+- 0.000  0.007+-0.007  CU
  16  ZN             0.023+- 0.004   0.063+- 0.012    0.012+- 0.010  0.511+-0.489  ZN
  17  AS             0.016+- 0.009   0.044+- 0.025    0.000+- 0.000  0.000+-0.017  AS
  18  BR      *      0.071+- 0.009   0.197+- 0.032    0.067+- 0.023  0.953+-0.446  BR
  19  SR             0.005+- 0.002   0.014+- 0.007    0.000+- 0.000  0.032+-0.058  SR
  20  CD                   <  0.159         <  0.444  0.001+- 0.001  0.000+-0.000  CD
  21  PB      *      0.186+- 0.024   0.517+- 0.085    0.175+- 0.026  0.945+-0.193  PB
  22  OC      *     15.910+- 2.420  44.309+- 8.149   13.098+- 3.647  0.823+-0.297  OC
  23  EC      *      3.060+- 0.650   8.522+- 2.013    3.710+- 2.222  1.212+-1.141  EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  35.9+- 3.7
```

```
CMBDEQ RESULTS FOR CMB # 010054
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  36   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 24 HRS. WITH START HOUR: 16
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.558 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG     UG/M3              %
 ----------------------------------------------------------------------------------
  1    RESWD    *  40.746+- 9.968  121.730+-32.614
  4    TRANS    *   1.333+- 0.230    3.981+- 0.814
  5    RDOIL    *   0.060+- 0.032    0.180+- 0.096
  9    RDUST    *   0.911+- 0.133    2.723+- 0.496
 14    ALUMP    *   0.372+- 0.160    1.111+- 0.493
 18    SECSO    *   0.677+- 0.371    2.024+- 1.129
 ----------------------------------------------------------------------------------
       TOTAL:      44.099+- 9.980  131.749+-33.106

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------
   1  NA      *      0.081+- 0.012   0.241+- 0.045    0.051+- 0.020  0.633+-0.290  NA
   2  MG             0.029+- 0.012   0.086+- 0.037    0.069+- 0.032  2.391+-2.901  MG
   3  AL      *      0.198+- 0.027   0.592+- 0.103    0.211+- 0.032  1.068+-0.234  AL
   4  SI      *      0.282+- 0.034   0.842+- 0.137    0.265+- 0.018  0.939+-0.087  SI
   5  P              0.038+- 0.007   0.113+- 0.024    0.003+- 0.000  0.072+-0.013  P
   6  S       *      0.366+- 0.058   1.095+- 0.212    0.366+- 0.105  1.000+-0.407  S
   7  CL      *      0.097+- 0.019   0.289+- 0.066    0.245+- 0.208  2.528+-5.832  CL
   8  K       *      0.129+- 0.018   0.384+- 0.068    0.365+- 0.285  2.842+-6.682  K
   9  CA      *      0.033+- 0.006   0.097+- 0.021    0.052+- 0.032  1.605+-1.857  CA
  10  TI      *      0.007+- 0.002   0.021+- 0.007    0.009+- 0.005  1.234+-1.142  TI
  11  V                     < 0.005         < 0.014   0.003+- 0.001  1.334+-0.551  V
  12  MN                    < 0.017         < 0.052   0.002+- 0.000  0.000+-0.000  MN
  13  FE      *      0.051+- 0.009   0.153+- 0.032    0.076+- 0.024  1.492+-0.848  FE
  14  NI      *      0.004+- 0.001   0.012+- 0.004    0.004+- 0.001  1.007+-0.318  NI
  15  CU             0.043+- 0.006   0.129+- 0.023    0.000+- 0.000  0.009+-0.010  CU
  16  ZN      *      0.018+- 0.003   0.053+- 0.011    0.017+- 0.015  0.956+-1.189  ZN
  17  AS                    < 0.082         < 0.244   0.000+- 0.000  0.000+-0.095  AS
  18  BR      *      0.072+- 0.009   0.217+- 0.036    0.071+- 0.024  0.980+-0.466  BR
  19  SR             0.003+- 0.002   0.009+- 0.007    0.000+- 0.000  0.040+-0.135  SR
  20  CD                    < 0.170         < 0.509   0.000+- 0.001  0.000+-0.000  CD
  21  PB      *      0.195+- 0.025   0.583+- 0.098    0.185+- 0.028  0.948+-0.195  PB
  22  OC      *     22.640+- 3.440  67.638+-12.656   19.958+- 5.624  0.882+-0.331  OC
  23  EC      *      3.770+- 0.790  11.263+- 2.661    5.564+- 3.425  1.476+-1.620  EC
 ----------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  33.5+- 3.7
```

```
CMBDEQ RESULTS FOR CMB # 010058
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  37   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 16
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.417 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG     UG/M3                    %
 ------------------------------------------------------------------------------------------
  1    RESWD   *  23.504+- 6.266   72.267+-20.744
  4    TRANS   *   0.789+- 0.141    2.426+- 0.505
  5    RDOIL   *   0.023+- 0.019    0.070+- 0.060
  9    RDUST   *   0.639+- 0.093    1.964+- 0.354
 11    MARIN   *   0.135+- 0.054    0.414+- 0.172
 14    ALUMP   *   0.411+- 0.162    1.264+- 0.517
 18    SECSO   *   1.987+- 0.367    6.110+- 1.303
 ------------------------------------------------------------------------------------------
       TOTAL:     27.487+- 6.282   84.515+-21.304

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3        PERCENT         CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------------
   1  NA       *      0.095+- 0.014    0.293+- 0.054     0.091+- 0.014  0.956+-0.203   NA
   2  MG              0.036+- 0.013    0.109+- 0.042     0.054+- 0.020  1.512+-1.001   MG
   3  AL       *      0.188+- 0.026    0.578+- 0.101     0.187+- 0.034  0.997+-0.252   AL
   4  SI       *      0.190+- 0.024    0.584+- 0.096     0.185+- 0.013  0.974+-0.092   SI
   5  P               0.042+- 0.007    0.129+- 0.026     0.002+- 0.000  0.046+-0.007   P
   6  S        *      0.745+- 0.098    2.291+- 0.388     0.745+- 0.070  1.000+-0.133   S
   7  CL       *      0.066+- 0.017    0.202+- 0.055     0.198+- 0.121  3.017+-5.833   CL
   8  K        *      0.115+- 0.016    0.352+- 0.063     0.215+- 0.165  1.875+-3.051   K
   9  CA       *      0.025+- 0.005    0.076+- 0.018     0.034+- 0.019  1.363+-1.278   CA
  10  TI       *      0.003+- 0.002    0.010+- 0.005     0.006+- 0.003  1.788+-1.945   TI
  11  V        *      0.002+- 0.001    0.006+- 0.004     0.001+- 0.000  0.633+-0.207   V
  12  MN                    <  0.019          <  0.059   0.002+- 0.000  0.000+-0.000   MN
  13  FE       *      0.047+- 0.009    0.144+- 0.031     0.051+- 0.014  1.089+-0.455   FE
  14  NI       *      0.002+- 0.001    0.006+- 0.003     0.002+- 0.001  1.148+-0.428   NI
  15  CU              0.042+- 0.006    0.129+- 0.024     0.000+- 0.000  0.007+-0.006   CU
  16  ZN       *      0.017+- 0.003    0.052+- 0.011     0.010+- 0.009  0.576+-0.596   ZN
  17  AS                    <  0.077          <  0.239   0.000+- 0.000  0.000+-0.000   AS
  18  BR       *      0.043+- 0.006    0.131+- 0.023     0.042+- 0.014  0.995+-0.473   BR
  19  SR                    <  0.010          <  0.031   0.000+- 0.000  0.028+-0.079   SR
  20  CD                    <  0.181          <  0.557   0.000+- 0.000  0.000+-0.000   CD
  21  PB       *      0.114+- 0.016    0.352+- 0.062     0.110+- 0.016  0.958+-0.198   PB
  22  OC       *     13.770+- 2.100   42.339+- 7.873    11.532+- 3.244  0.837+-0.307   OC
  23  EC       *      2.690+- 0.570    8.271+- 1.961     3.215+- 1.976  1.195+-1.144   EC
 ------------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  32.5+- 3.5
```

```
CMBDEQ RESULTS FOR CMB # 010196
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81  38   SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.498 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG      UG/M3               %
 -------------------------------------------------------------------------------------
  1    RESWD    *  62.773+-15.224   87.760+-23.153
  4    TRANS    *   1.747+- 0.297    2.443+- 0.487
  9    RDUST    *   1.246+- 0.177    1.743+- 0.306
 14    ALUMP    *   0.330+- 0.177    0.461+- 0.252
 18    SECSO    *   1.553+- 0.559    2.171+- 0.813
 -------------------------------------------------------------------------------------
       TOTAL:      67.649+-15.239   94.577+-23.460

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 -------------------------------------------------------------------------------------
   1  NA      *      0.096+- 0.015   0.134+- 0.025     0.066+- 0.029  0.685+-0.372  NA
   2  MG             0.029+- 0.015   0.041+- 0.022     0.093+- 0.048  3.185+-5.472  MG
   3  AL      *      0.235+- 0.031   0.328+- 0.055     0.242+- 0.031  1.030+-0.189  AL
   4  SI      *      0.379+- 0.045   0.530+- 0.084     0.360+- 0.024  0.949+-0.089  SI
   5  P              0.067+- 0.010   0.094+- 0.017     0.004+- 0.001  0.055+-0.011  P
   6  S       *      0.704+- 0.096   0.985+- 0.169     0.704+- 0.155  1.000+-0.311  S
   7  CL      *      0.238+- 0.035   0.333+- 0.060     0.366+- 0.320  1.537+-2.460  CL
   8  K       *      0.202+- 0.026   0.282+- 0.047     0.560+- 0.439  2.771+-6.409  K
   9  CA      *      0.032+- 0.006   0.045+- 0.010     0.073+- 0.046  2.297+-3.632  CA
  10  TI      *      0.012+- 0.003   0.017+- 0.005     0.011+- 0.007  0.899+-0.701  TI
  11  V                    <  0.015        <  0.021    0.001+- 0.001  0.000+-0.000  V
  12  MN                   <  0.007        <  0.010    0.003+- 0.001  2.752+-1.822  MN
  13  FE      *      0.066+- 0.011   0.093+- 0.018     0.100+- 0.032  1.502+-0.861  FE
  14  NI             0.002+- 0.001   0.003+- 0.001     0.001+- 0.001  0.329+-0.318  NI
  15  CU             0.049+- 0.007   0.068+- 0.012     0.000+- 0.001  0.008+-0.013  CU
  16  ZN      *      0.026+- 0.004   0.037+- 0.007     0.025+- 0.023  0.961+-1.232  ZN
  17  AS             0.010+- 0.009   0.014+- 0.013     0.000+- 0.001  0.000+-0.061  AS
  18  BR      *      0.102+- 0.012   0.143+- 0.023     0.093+- 0.032  0.912+-0.420  BR
  19  SR                   <  0.029        <  0.040    0.000+- 0.001  0.000+-0.000  SR
  20  CD                   <  0.204        <  0.286    0.001+- 0.001  0.000+-0.000  CD
  21  PB      *      0.247+- 0.031   0.345+- 0.056     0.242+- 0.036  0.981+-0.205  PB
  22  OC      *     36.760+- 5.590  51.393+- 9.464    30.591+- 8.664  0.832+-0.307  OC
  23  EC      *      5.010+- 1.040   7.004+- 1.626     8.491+- 5.276  1.695+-2.072  EC
 -------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  71.5+- 7.4
```

```
CMBDEC RESULTS FOR CMB # 010199
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 310    SITE: SITE 1   SITE CODE: 0000001
SAMPLING DURATION: 22 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO.
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.517 DEGREES OF FREEDOM: 11
 CODE SOURCE FLG      UG/M3               %
---------------------------------------------------------------------------------------------
  1    RESWD    *  65.303+-15.556.  86.484+-22.436
  4    TRANS    *   1.968+- 0.335    2.606+- 0.519
  5    RDOIL    *   0.089+- 0.033    0.117+- 0.046
  9    RDUST    *   1.760+- 0.189    2.331+- 0.347
 18    SECSO    *   1.053+- 0.562    1.394+- 0.758
---------------------------------------------------------------------------------------------
       TOTAL:      70.172+-15.571   92.932+-22.725

 SPECIE       FIT              FINE  SUSPENDED PARTICULATE
 CODE         FLG       MEAS. UG/M3        PERCENT         CALC. UG/M3         RATIO
---------------------------------------------------------------------------------------------
   1   NA      *      0.079+- 0.013  . 0.105+- 0.020     0.057+- 0.030   0.723+-0.468   NA
   2   MG             0.053+- 0.019    0.070+- 0.026     0.097+- 0.050   1.831+-1.961   MG
   3   AL      *      0.250+- 0.033    0.331+- 0.055     0.211+- 0.019   0.843+-0.100   AL
   4   SI      *      0.487+- 0.057    0.645+- 0.100     0.505+- 0.034   1.037+-0.102   SI
   5   P              0.065+- 0.010    0.086+- 0.016     0.005+- 0.001   0.081+-0.013   P
   6   S       *      0.562+- 0.081    0.744+- 0.132     0.562+- 0.164   1.000+-0.413   S
   7   CL      *      0.243+- 0.036    0.322+- 0.058     0.381+- 0.333   1.567+-2.546   CL
   8   K       *      0.208+- 0.027    0.276+- 0.046     0.589+- 0.457   2.825+-6.571   K
   9   CA      *      0.051+- 0.008    0.068+- 0.013     0.082+- 0.050   1.602+-1.828   CA
  10   TI      *      0.013+- 0.003    0.017+- 0.004     0.014+- 0.007   1.099+-0.846   TI
  11   V       *      0.002+- 0.002    0.003+- 0.002     0.003+- 0.001   1.583+-0.804   V
  12   MN                   < 0.020          < 0.027     0.004+- 0.001   0.000+-0.000   MN
  13   FE      *      0.088+- 0.013    0.117+- 0.021     0.132+- 0.036   1.493+-0.729   FE
  14   NI      *      0.006+- 0.002    0.008+- 0.003     0.005+- 0.001   0.795+-0.260   NI
  15   CU             0.053+- 0.007    0.070+- 0.012     0.000+- 0.001   0.007+-0.013   CU
  16   ZN      *      0.028+- 0.004    0.037+- 0.007     0.027+- 0.024   0.963+-1.210   ZN
  17   AS                   < 0.030          < 0.040     0.000+- 0.001   0.000+-0.065   AS
  18   BR      *      0.107+- 0.013    0.142+- 0.023     0.105+- 0.036   0.976+-0.464   BR
  19   SR             0.006+- 0.003    0.008+- 0.004     0.000+- 0.001   0.040+-0.115   SR
  20   CD                   < 0.081          < 0.107     0.001+- 0.001   0.070+-0.098   CD
  21   PB      *      0.288+- 0.035    0.382+- 0.061     0.274+- 0.041   0.948+-0.195   PB
  22   OC      *     37.440+- 5.760   49.583+- 9.173    31.876+- 9.013   0.851+-0.316   OC
  23   EC      *      5.280+- 1.100    6.993+- 1.624     8.873+- 5.489   1.680+-2.033   EC
---------------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  75.5+- 7.8
```

```
CMBDEQ RESULTS FOR CMB # 010032
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 204   SITE: SITE 2   SITE CODE: 0000002
SAMPLING DURATION: 24 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.205 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG      UG/M3               %
 ------------------------------------------------------------------------------------------
  1    RESWD    *   8.305+- 2.258   97.496+-28.733
  4    TRANS    *   0.174+- 0.037    2.038+- 0.488
  9    RDUST    *   0.347+- 0.039    4.076+- 0.649
 18    SECSO    *   2.304+- 0.315   27.050+- 4.808
 ------------------------------------------------------------------------------------------
       TOTAL:      11.130+- 2.280  130.660+-30.621

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG        MEAS  UG/M3          PERCENT          CALC. UG/M3          RATIO
 ------------------------------------------------------------------------------------------
   1   NA              0.030+- 0.005   0.350+- 0.069     0.007+- 0.004   0.231+-0.132   NA
   2   MG                   <  0.091        <  1.071     0.014+- 0.006   0.000+-0.000   MG
   3   AL        *     0.058+- 0.009   0.683+- 0.132     0.040+- 0.003   0.691+-0.066   AL
   4   SI        *     0.094+- 0.012   1.101+- 0.187     0.098+- 0.007   1.046+-0.104   SI
   5   P               0.039+- 0.005   0.455+- 0.081     0.001+- 0.000   0.027+-0.004   P
   6   S         *     0.784+- 0.094   9.199+- 1.523     0.784+- 0.043   1.000+-0.078   S
   7   CL                   <  0.131        <  1.543     0.047+- 0.042   0.000+-0.000   CL
   8   K         *     0.048+- 0.007   0.560+- 0.105     0.077+- 0.058   1.610+-2.310   K
   9   CA        *     0.014+- 0.003   0.164+- 0.039     0.010+- 0.006   0.740+-0.504   CA
  10   TI              0.001+- 0.001   0.012+- 0.009     0.002+- 0.001   2.092+-1.538   TI
  11   V                    <  0.012        <  0.143     0.000+- 0.000   0.000+-0.000   V
  12   MN              0.002+- 0.001   0.026+- 0.010     0.001+- 0.000   0.379+-0.056   MN
  13   FE        *     0.015+- 0.003   0.173+- 0.046     0.022+- 0.003   1.466+-0.407   FE
  14   NI              0.001+- 0.001   0.016+- 0.010     0.000+- 0.000   0.026+-0.065   NI
  15   CU              0.003+- 0.001   0.038+- 0.016     0.000+- 0.000   0.020+-0.028   CU
  16   ZN              0.025+- 0.003   0.291+- 0.053     0.003+- 0.003   0.134+-0.125   ZN
  17   AS                   <  0.060        <  0.701     0.000+- 0.000   0.000+-0.000   AS
  18   BR        *     0.007+- 0.001   0.080+- 0.018     0.009+- 0.003   1.359+-0.780   BR
  19   SR                   <  0.026        <  0.309     0.000+- 0.000   0.000+-0.000   SR
  20   CD              0.011+- 0.008   0.128+- 0.099     0.000+- 0.000   0.017+-0.022   CD
  21   PB        *     0.029+- 0.005   0.337+- 0.071     0.024+- 0.004   0.848+-0.164   PB
  22   OC        *     3.790+- 0.600  44.491+- 8.675     4.020+- 1.146   1.061+-0.441   OC
  23   EC        *     1.280+- 0.290  15.026+- 3.810     1.108+- 0.699   0.866+-0.721   EC
 ------------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:    8.5+- 1.0
```

```
CMBOEQ RESULTS FOR CMB # 010034
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 206   SITE: SITE 2,  SITE CODE: 0000002
SAMPLING DURATION: 23 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   2.282 DEGREES OF FREEDOM:  3
 CODE SOURCE FLG      UG/M3                  %
 -------------------------------------------------------------------------------
  1   RESWD    *   4.865+- 3.162   76.710+-50.756
  9   RDUST    *   0.274+- 0.030    4.325+- 0.711
 18   SECSO    *   1.971+- 0.266,  31.071+- 5.693
 -------------------------------------------------------------------------------
      TOTAL:       7.110+- 3.174  112.106+-51.927

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 -------------------------------------------------------------------------------
   1  NA              0.023+- 0.003   0.359+- 0.071     0.004+- 0.002  0.177+-0.100  NA
   2  MG              0.007+- 0.003   0.107+- 0.055     0.009+- 0.004  1.275+-0.852  MG
   3  AL        *     0.051+- 0.008   0.806+- 0.162     0.031+- 0.002  0.611+-0.054  AL
   4  SI        *     0.070+- 0.009   1.110+- 0.200     0.077+- 0.005  1.090+-0.112  SI
   5  P               0.033+- 0.005   0.520+- 0.098     0.001+- 0.000  0.025+-0.003  P
   6  S         *     0.660+- 0.080  10.409+- 1.808     0.660+- 0.035  1.000+-0.075  S
   7  CL                   <  0.127         <  2.004     0.025+- 0.025  0.000+-0.000  CL
   8  K         *     0.035+- 0.006   0.557+- 0.113     0.046+- 0.034  1.305+-1.587  K
   9  CA        *     0.006+- 0.002   0.091+- 0.031     0.005+- 0.003  0.938+-0.692  CA
  10  TI        .          <  0.020         <  0.314     0.001+- 0.000  0.000+-0.000  TI
  11  V               0.001+- 0.001   0.011+- 0.010     0.000+- 0.000  0.097+-0.083  V
  12  MN              0.001+- 0.001   0.014+- 0.011     0.001+- 0.000  0.732+-0.109  MN
  13  FE        *     0.012+- 0.003   0.183+- 0.052     0.014+- 0.001  1.249+-0.142  FE
  14  NI                   <  0.019         <  0.293     0.000+- 0.000  0.000+-0.000  NI
  15  CU              0.005+- 0.001   0.077+- 0.023     0.000+- 0.000  0.010+-0.012  CU
  16  ZN              0.006+- 0.001   0.096+- 0.024     0.002+- 0.002  0.307+-0.309  ZN
  17  AS              0.006+- 0.002   0.093+- 0.038     0.000+- 0.000  0.000+-0.009  AS
  18  BR                   <  0.020         <  0.314     0.000+- 0.000  0.000+-0.000  BR
  19  SR              0.002+- 0.001   0.036+- 0.023     0.000+- 0.000  0.016+-0.026  SR
  20  CD                   <  0.180         <  2.835     0.000+- 0.000  0.000+-0.000  CD
  21  PB              0.003+- 0.003   0.054+- 0.052     0.000+- 0.000  0.086+-0.025  PB
  22  OC                   <  0.320         <  5.045     2.311+- 0.671 $23110+-$1551  OC
  23  EC                   <  0.130         <  2.061     0.623+- 0.409  5.662+-$21.3  EC
 -------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:   6.3+- 0.8
```

```
CMBDEQ RESULTS FOR CMB # 010040
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 301   SITE: SITE 2   SITE CODE: 0000002
SAMPLING DURATION: 24 HRS. WITH START HOUR: 12
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.555 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG      UG/M3              %
 ------------------------------------------------------------------------------------------
  1    RESWD    *   4.830+- 1.373   93.987+-29.564
  4    TRANS    *   0.140+- 0.032    2.730+- 0.715
  9    RDUST    *   0.266+- 0.032    5.183+- 0.936
 18    SECSO    *   0.666+- 0.111   12.957+- 2.783
 ------------------------------------------------------------------------------------------
       TOTAL:       5.902+- 1.378  114.957+-30.960

 SPECIE       FIT             FINE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------------
   1   NA            0.021+- 0.004   0.407+- 0.089   0.004+- 0.002   0.192+-0.108   NA
   2   MG                  < 0.089         < 1.730   0.010+- 0.004   0.000+-0.000   MG
   3   AL        *   0.041+- 0.007   0.808+- 0.180   0.031+- 0.002   0.736+-0.069   AL
   4   SI        *   0.079+- 0.010   1.537+- 0.287   0.075+- 0.005   0.954+-0.090   SI
   5   P             0.012+- 0.003   0.232+- 0.059   0.001+- 0.000   0.067+-0.008   P
   6   S         *   0.235+- 0.033   4.573+- 0.887   0.235+- 0.016   1.000+-0.099   S
   7   CL                  < 0.121         < 2.351   0.028+- 0.025   0.000+-0.000   CL
   8   K         *   0.020+- 0.004   0.393+- 0.093   0.046+- 0.034   2.260+-4.137   K
   9   CA        *   0.007+- 0.002   0.136+- 0.045   0.007+- 0.004   0.999+-0.733   CA
  10   TI            0.002+- 0.001   0.037+- 0.018   0.002+- 0.001   0.857+-0.369   TI
  11   V                   < 0.011         < 0.212   0.000+- 0.000   0.000+-0.000   V
  12   MN            0.001+- 0.001   0.023+- 0.016   0.001+- 0.000   0.533+-0.071   MN
  13   FE        *   0.009+- 0.003   0.167+- 0.061   0.017+- 0.003   1.937+-0.685   FE
  14   NI                  < 0.010         < 0.200   0.000+- 0.000   0.000+-0.000   NI
  15   CU            0.007+- 0.002   0.132+- 0.036   0.000+- 0.000   0.007+-0.008   CU
  16   ZN            0.009+- 0.002   0.185+- 0.041   0.002+- 0.002   0.209+-0.193   ZN
  17   AS                  < 0.057         < 1.111   0.000+- 0.000   0.000+-0.000   AS
  18   BR        *   0.005+- 0.001   0.091+- 0.023   0.007+- 0.003   1.588+-1.014   BR
  19   SR                  < 0.027         < 0.525   0.000+- 0.000   0.000+-0.000   SR
  20   CD                  < 0.154         < 2.999   0.000+- 0.000   0.000+-0.000   CD
  21   PB        *   0.026+- 0.005   0.514+- 0.116   0.020+- 0.003   0.744+-0.137   PB
  22   OC        *   2.540+- 0.430  49.427+-10.690   2.355+- 0.667   0.927+-0.358   OC
  23   EC        *   0.680+- 0.180  13.232+- 3.930   0.655+- 0.406   0.963+-0.829   EC
 ------------------------------------------------------------------------------------------
MEAS  AMB. MASS (UG/M3):  FINE:    5.1+- 0.7
```

```
CMBDEQ RESULTS FOR CMB # 010062
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 206   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 24 HRS. WITH START HOUR:  7
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.378 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                 %
 ------------------------------------------------------------------------------------
  1    RESWD   *  37.372+-10.931   81.117+-25.086
  4    TRANS   *   5.659+- 0.965   12.284+- 2.431
  5    RDOIL   *   0.057+- 0.022    0.125+- 0.049
  8    ROUST   *   0.846+- 0.107    1.836+- 0.296
 11    MARIN   *   0.698+- 0.141    1.516+- 0.341
 18    SECSO   *   2.628+- 1.004    5.703+- 2.253
 19.   GALVN   *   0.255+- 0.039    0.552+- 0.102
 ------------------------------------------------------------------------------------
       TOTAL:     47.515+-11.020  103.133+-26.068

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT        CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA       *      0.313+- 0.045   0.679+- 0.119    0.312+- 0.033  0.999+-0.148  NA
   2  MG              0.028+- 0.013   0.060+- 0.029    0.120+- 0.050  4.328+-8.055  MG
   3  AL       *      0.149+- 0.019   0.324+- 0.053    0.110+- 0.012  0.738+-0.102  AL
   4  SI       *      0.232+- 0.027   0.504+- 0.077    0.265+- 0.020  1.143+-0.128  SI
   5  P               0.083+- 0.010   0.181+- 0.029    0.003+- 0.000  0.034+-0.006  P
   6  S        *      1.191+- 0.148   2.585+- 0.413    1.191+- 0.294  1.000+-0.349  S
   7  CL              0.088+- 0.018   0.192+- 0.044    0.603+- 0.207  6.811+-$16.1  CL
   8  K        *      0.251+- 0.030   0.544+- 0.085    0.337+- 0.262  1.345+-1.749  K
   9  CA              0.053+- 0.007   0.114+- 0.020    0.109+- 0.091  2.077+-3.969  CA
  10  TI       *      0.009+- 0.002   0.020+- 0.005    0.022+- 0.021  2.433+-6.122  TI
  11  V        *      0.002+- 0.001   0.004+- 0.002    0.002+- 0.001  1.282+-0.523  V
  12  MN              0.010+- 0.002   0.021+- 0.004    0.001+- 0.000  0.126+-0.041  MN
  13  FE       *      0.209+- 0.025   0.454+- 0.071    0.149+- 0.101  0.710+-0.594  FE
  14  NI       *      0.004+- 0.001   0.008+- 0.003    0.003+- 0.001  0.810+-0.268  NI
  15  CU              0.017+- 0.003   0.037+- 0.007    0.000+- 0.000  0.007+-0.023  CU
  16  ZN       *      0.224+- 0.026   0.486+- 0.074    0.224+- 0.018  1.000+-0.113  ZN
  17  AS                    <  0.274          <  0.595 0.000+- 0.000  0.000+-0.000  AS
  18  BR       *      0.130+- 0.015   0.283+- 0.043    0.302+- 0.102  2.323+-1.990  BR
  19  SR              0.003+- 0.002   0.006+- 0.004    0.000+- 0.000  0.065+-0.143  SR
  20  CD              0.061+- 0.014   0.132+- 0.033    0.000+- 0.001  0.005+-0.010  CD
  21  PB       *      0.947+- 0.107   2.056+- 0.311    0.782+- 0.117  0.825+-0.160  PB
  22  OC       *     17.850+- 3.190  38.744+- 7.943   20.198+- 5.180  1.132+-0.438  OC
  23  EC       *      8.930+- 1.850  19.383+- 4.463    6.262+- 3.186  0.701+-0.436  EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  46.1+- 4.6
```

```
CMBDEQ RESULTS FOR CMB # 010064
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 207   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 21 HRS. WITH START HOUR:  7
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.253 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG     UG/M3                %
 ------------------------------------------------------------------------------
  1    RESWD   *  48.880+-13.835   96.847+-29.090
  4    TRANS   *   2.946+- 0.501    5.837+- 1.153
  5    RDOIL   *   0.066+- 0.023    0.130+- 0.048
  8    RDUST   *   0.691+- 0.086    1.369+- 0.218
 11    MARIN   *   0.418+- 0.110    0.827+- 0.233
 18    SECSO   *   2.436+- 0.672    4.827+- 1.418
 19    GALVN   *   0.081+- 0.027    0.161+- 0.056
 ------------------------------------------------------------------------------
      TOTAL:      55.517+-13.861  109.998+-29.607

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3        PERCENT        CALC. UG/M3       RATIO
 ------------------------------------------------------------------------------
   1  NA       *     0.220+- 0.032   0.436+- 0.077    0.210+- 0.028  0.953+-0.176  NA
   2  MG             0.016+- 0.011   0.032+- 0.022    0.090+- 0.042  5.654+-$15.1  MG
   3  AL       *     0.130+- 0.018   0.258+- 0.044    0.092+- 0.012  0.703+-0.110  AL
   4  SI       *     0.184+- 0.022   0.365+- 0.057    0.207+- 0.014  1.122+-0.113  SI
   5  P              0.071+- 0.009   0.140+- 0.023    0.002+- 0.001  0.033+-0.008  P
   6  S        *     1.034+- 0.125   2.048+- 0.323    1.034+- 0.180  1.000+-0.247  S
   7  CL       *     0.127+- 0.021   0.252+- 0.048    0.485+- 0.253  3.821+-7.878  CL
   8  K        *     0.246+- 0.030   0.488+- 0.077    0.431+- 0.342  1.751+-2.800  K
   9  CA             0.024+- 0.004   0.047+- 0.010    0.080+- 0.054  3.350+-7.940  CA
  10  TI             0.003+- 0.001   0.006+- 0.003    0.013+- 0.011  4.478+-$17.8  TI
  11  V        *     0.002+- 0.001   0.005+- 0.002    0.003+- 0.001  1.052+-0.422  V
  12  MN             0.003+- 0.001   0.007+- 0.002    0.001+- 0.001  0.303+-0.154  MN
  13  FE       *     0.070+- 0.010   0.138+- 0.024    0.091+- 0.053  1.301+-1.239  FE
  14  NI       *     0.004+- 0.001   0.007+- 0.003    0.004+- 0.001  0.949+-0.347  NI
  15  CU             0.007+- 0.002   0.015+- 0.004    0.000+- 0.000  0.014+-0.066  CU
  16  ZN       *     0.086+- 0.010   0.171+- 0.027    0.086+- 0.019  1.000+-0.304  ZN
  17  AS                   < 0.176         < 0.349    0.000+- 0.000  0.000+-0.000  AS
  18  BR       *     0.112+- 0.013   0.222+- 0.034    0.158+- 0.053  1.406+-0.821  BR
  19  SR                   < 0.027         < 0.053    0.000+- 0.000  0.000+-0.000  SR
  20  CD             0.018+- 0.010   0.037+- 0.021    0.000+- 0.001  0.015+-0.034  CD
  21  PB       *     0.459+- 0.053   0.910+- 0.139    0.407+- 0.061  0.887+-0.178  PB
  22  OC       *    23.430+- 4.240  46.423+- 9.610   24.495+- 6.750  1.045+-0.417  OC
  23  EC       *    12.020+- 2.490  23.816+- 5.484    7.026+- 4.116  0.585+-0.397  EC
 ------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  50.5+- 5.1
```

```
CMBDEQ RESULTS FOR CMB # 010066
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 208   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 23 HRS. WITH START HOUR:  7
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.434 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                %
---------------------------------------------------------------------------------------
  1    RESWD    *  38.395+-10.833    86.045+-25.773
  4    TRANS    *   1.811+- 0.307     4.059+- 0.799
  5    RDOIL    *   0.041+- 0.016     0.093+- 0.038
  8    RDUST    *   0.545+- 0.067     1.221+- 0.193
 11    MARIN    *   0.633+- 0.131     1.418+- 0.325
 18    SECSO    *   3.389+- 0.612     7.595+- 1.571
 19    GALVN    *   0.048+- 0.020     0.107+- 0.047
---------------------------------------------------------------------------------------
     TOTAL:        44.863+-10.856   100.538+-26.345

SPECIE      FIT             FINE  SUSPENDED PARTICULATE
CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3         RATIO
---------------------------------------------------------------------------------------
  1   NA     *       0.287+- 0.041     0.642+- 0.113     0.286+- 0.031   0.999+-0.152   NA
  2   MG             0.018+- 0.010     0.040+- 0.023     0.081+- 0.032   4.573+-8.361   MG
  3   AL     *       0.117+- 0.016     0.262+- 0.044     0.071+- 0.009   0.612+-0.090   AL
  4   SI     *       0.140+- 0.017     0.314+- 0.049     0.160+- 0.010   1.143+-0.114   SI
  5   P              0.077+- 0.009     0.173+- 0.027     0.002+- 0.000   0.024+-0.005   P
  6   S      *       1.288+- 0.152     2.886+- 0.447     1.288+- 0.132   1.000+-0.145   S
  7   CL             0.061+- 0.014     0.136+- 0.034     0.491+- 0.206   8.105+-*27.7   CL
  8   K      *       0.243+- 0.029     0.544+- 0.085     0.343+- 0.269   1.413+-1.916   K
  9   CA             0.017+- 0.004     0.038+- 0.009     0.061+- 0.036   3.596+-7.979   CA
 10   TI     *       0.003+- 0.001     0.007+- 0.003     0.008+- 0.007   2.575+-5.797   TI
 11   V      *       0.002+- 0.001     0.004+- 0.002     0.002+- 0.000   0.862+-0.346   V
 12   MN             0.002+- 0.001     0.004+- 0.002     0.001+- 0.000   0.404+-0.212   MN
 13   FE     *       0.044+- 0.007     0.098+- 0.018     0.062+- 0.032   1.411+-1.279   FE
 14   NI     *       0.002+- 0.001     0.004+- 0.002     0.002+- 0.001   1.110+-0.473   NI
 15   CU             0.005+- 0.002     0.012+- 0.004     0.000+- 0.000   0.014+-0.070   CU
 16   ZN     *       0.054+- 0.007     0.122+- 0.020     0.054+- 0.014   1.000+-0.374   ZN
 17   AS                   <  0.148          <  0.332    0.000+- 0.000   0.000+-0.000   AS
 18   BR     *       0.079+- 0.009     0.177+- 0.027     0.098+- 0.033   1.237+-0.661   BR
 19   SR                   <  0.027          <  0.061    0.000+- 0.000   0.000+-0.000   SR
 20   CD             0.012+- 0.009     0.028+- 0.020     0.000+- 0.000   0.017+-0.039   CD
 21   PB     *       0.279+- 0.033     0.626+- 0.096     0.251+- 0.037   0.897+-0.180   PB
 22   OC     *      15.410+- 2.860    34.534+- 7.290    19.023+- 5.301   1.234+-0.546   OC
 23   EC     *       8.790+- 1.820    19.699+- 4.534     5.388+- 3.230   0.613+-0.431   EC
---------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  44.6+- 4.5
```

```
CMBDEQ RESULTS FOR CMB # 010068.
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 209   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 23 HRS. WITH START HOUR:  7
BACKGROUND SITE SUBTRACTED: NO.
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.855 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                 %
 ---------------------------------------------------------------------------------
  1   RESWD   *  24.148+- 6.857   62.487+-18.826
  4   TRANS   *   1.801+- 0.301    4.659+- 0.910
  5   RDOIL   *   0.088+- 0.024    0.229+- 0.066
  8   RDUST   *   0.673+- 0.078    1.742+- 0.267
 11   MARIN   *   0.455+- 0.092    1.178+- 0.266
 18   SECSO   *   2.773+- 0.514    7.175+- 1.513
 19   GALVN   *   0.025+- 0.013    0.065+- 0.034
 ---------------------------------------------------------------------------------
      TOTAL:     29.963+- 6.884   77.535+-19.450

 SPECIE      FIT           FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT          CALC. UG/M3        RATIO
 ---------------------------------------------------------------------------------
   1  NA      *      0.205+- 0.029   0.531+- 0.093    0.205+- 0.021  1.000+-0.147  NA
   2  MG             0.011+- 0.009   0.027+- 0.022    0.064+- 0.023  5.997+-$12.9  MG
   3  AL      *      0.117+- 0.016   0.302+- 0.052    0.083+- 0.007  0.710+-0.077  AL
   4  SI      *      0.175+- 0.021   0.454+- 0.071    0.195+- 0.013  1.115+-0.108  SI
   5  P              0.066+- 0.008   0.171+- 0.028    0.002+- 0.000  0.034+-0.005  P
   6  S       *      1.059+- 0.126   2.740+- 0.428    1.059+- 0.112  1.000+-0.150  S
   7  CL             0.109+- 0.018   0.283+- 0.055    0.347+- 0.132  3.176+-4.012  CL
   8  K       *      0.192+- 0.023   0.498+- 0.079    0.219+- 0.169  1.140+-1.333  K
   9  CA             0.012+- 0.003   0.031+- 0.009    0.051+- 0.031  4.201+-$11.2  CA
  10  TI      *      0.004+- 0.001   0.011+- 0.004    0.009+- 0.007  2.005+-3.397  TI
  11  V       *      0.003+- 0.001   0.009+- 0.003    0.003+- 0.001  1.002+-0.305  V
  12  MN             0.003+- 0.001   0.008+- 0.002    0.001+- 0.000  0.338+-0.092  MN
  13  FE      *      0.041+- 0.006   0.106+- 0.019    0.070+- 0.032  1.700+-1.558  FE
  14  NI      *      0.005+- 0.001   0.012+- 0.004    0.005+- 0.001  0.988+-0.322  NI
  15  CU             0.007+- 0.002   0.013+- 0.005    0.000+- 0.000  0.018+-0.036  CU
  16  ZN      *      0.031+- 0.004   0.081+- 0.014    0.031+- 0.009  1.000+-0.412  ZN
  17  AS                   <  0.145          < 0.375    0.000+- 0.000  0.000+-0.000  AS
  18  BR      *      0.100+- 0.012   0.258+- 0.040    0.097+- 0.033  0.971+-0.456  BR
  19  SR                   <  0.029          < 0.075    0.000+- 0.000  0.000+-0.000  SR
  20  CD                   <  0.184          < 0.475    0.000+- 0.000  0.000+-0.000  CD
  21  PB      *      0.263+- 0.031   0.680+- 0.105    0.249+- 0.037  0.949+-0.196  PB
  22  OC      *     10.980+- 1.860  28.413+- 5.600   12.256+- 3.336  1.116+-0.455  OC
  23  EC      *      4.690+- 0.980  12.136+- 2.815    3.561+- 2.036  0.759+-0.545  EC
 ---------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  38.6+- 3.9
```

```
CMBDEQ RESULTS FOR CMB # 010070
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 210   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 23 HRS. WITH START HOUR:  7
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.412 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG     UG/M3                 %
 ------------------------------------------------------------------------------------
  1    RESWD   *  25.031+- 7.090   80.928+-24.340
  4    TRANS   *   1.407+- 0.236    4.550+- 0.890
  5    RDOIL   *   0.039+- 0.019    0.125+- 0.064
  8    RDUST   *   0.708+- 0.079    2.290+- 0.345
 11    MARIN   *   0.096+- 0.040    0.311+- 0.135
 18    SECSO   *   1.628+- 0.369    5.264+- 1.306
 ------------------------------------------------------------------------------------
       TOTAL:   · 28.909+- 7.104   93.467+-24.837

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT         CALC. UG/M3       RATIO
 ------------------------------------------------------------------------------------
   1  NA       *       0.061+- 0.009    0.196+- 0.035     0.061+- 0.012  1.000+-0.284  NA
   2  MG               0.014+- 0.006    0.045+- 0.020     0.044+- 0.021  3.192+-5.114  MG
   3  AL       *       0.100+- 0.014    0.323+- 0.056     0.086+- 0.007  0.863+-0.099  AL
   4  SI       *       0.194+- 0.023    0.628+- 0.098     0.202+- 0.013  1.041+-0.097  SI
   5  P                0.054+- 0.007    0.174+- 0.028     0.002+- 0.000  0.044+-0.006  P
   6  S        *       0.649+- 0.080    2.098+- 0.335     0.649+- 0.090  1.000+-0.196  S
   7  CL               0.055+- 0.012    0 177+- 0.043     0.199+- 0.128  3.634+-8.820  CL
   8  K        *       0.198+- 0.024    0.641+- 0.101     0.222+- 0.175  1.119+-1.326  K
   9  CA               0.025+- 0.004    0.080+- 0.016     0.041+- 0.026  1.666+-2.075  CA
  10  TI       *       0.003+- 0.001    0.010+- 0.004     0.008+- 0.005  2.471+-4.489  TI
  11  V                      <  0.012          <  0.038   0.002+- 0.000  0.000+-0.000  V
  12  MN               0.001+- 0.001    0.003+- 0 002     0.001+- 0.000  1.159+-0.461  MN
  13  FE       *       0.041+- 0.006    0.131+- 0.024     0.063+- 0.025  1.540+-1.144  FE
  14  NI       *       0.002+- 0.001    0 007+- 0 003     0.002+- 0.001  0.989+-0.356  NI
  15  CU               0.003+- 0.001    0.010+- 0.004     0.000+- 0.000  0.027+-0.080  CU
  16  ZN               0.018+- 0.003    0.058+- 0.011     0.011+- 0 009  0.614+-0 613  ZN
  17  AS               0.012+- 0.006    0.040+- 0.020     0.000+- 0 000  0.000+-0 020  AS
  18  BR       *       0.081+- 0 009    0.263+- 0.041     0 075+- 0.025  0.923+-0.426  BR
  19  SR                     <  0.026          <  0.083   0.000+- 0.000  0.000+-0 000  SR
  20  CD                     <  0 168          <  0 542   0.000+- 0 000  0.000+-0.000  CD
  21  PB       *       0.202+- 0.024    0 654+- 0 102     0 195+- 0 029  0.964+-0 200  PB
  22  OC       *      11.870+- 1 960   38 377+- 7 431    12.500+- 3 456  1.053+-0 423  OC
  23  EC       *       4.160+- 0.370   13.450+- 3.124     3 572+- 2.107  0.859+-0.668  EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  30.9+- 3.1
```

```
CMBDEQ RESULTS FOR CMB # 010153
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 301   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 23 HRS. WITH START HOUR:  7
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    1.047 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                 %
 ---------------------------------------------------------------------------------
  1    RESWD    *  28.893+- 8.084   85.028+-25.292
  4    TRANS    *   1.341+- 0.228    3.947+- 0.780
  5    RDOIL    *   0.123+- 0.030    0.361+- 0.095
  8    RDUST    *   0.738+- 0.083    2.171+- 0.327
 11    MARIN    *   0.355+- 0.080    1.045+- 0.258
 18    SECSO    *   1.950+- 0.408    5.733+- 1.333
 19    GALVN    *   0.027+- 0.015    0.080+- 0.045
 ---------------------------------------------------------------------------------
       TOTAL:      33.427+- 8.099   98.369+-25.819

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ---------------------------------------------------------------------------------
   1  NA       *      0.170+- 0.024    0.501+- 0.088    0.170+- 0.020  1.000+-0.162  NA
   2  MG              0.011+- 0.009    0.033+- 0.027    0.059+- 0.024  5.231+-$11.2  MG
   3  AL       *      0.124+- 0.017    0.366+- 0.062    0.091+- 0.008  0.728+-0.081  AL
   4  SI       *      0.191+- 0.023    0.563+- 0.087    0.211+- 0.013  1.102+-0.105  SI
   5  P               0.051+- 0.007    0.150+- 0.025    0.002+- 0.000  0.048+-0.007  P
   6  S        *      0.779+- 0.095    2.294+- 0.362    0.779+- 0.094  1.000+-0.171  S
   7  CL              0.093+- 0.016    0.275+- 0.055    0.321+- 0.152  3.431+-5.797  CL
   8  K        *      0.218+- 0.026    0.641+- 0.101    0.259+- 0.202  1.189+-1.442  K
   9  CA              0.014+- 0.003    0.042+- 0.011    0.048+- 0.027  3.404+-6.769  CA
  10  TI       *      0.008+- 0.002    0.024+- 0.006    0.008+- 0.005  0.936+-0.832  TI
  11  V        *      0.005+- 0.001    0.016+- 0.004    0.005+- 0.001  0.836+-0.234  V
  12  MN              0.001+- 0.001    0.004+- 0.002    0.001+- 0.000  0.803+-0.283  MN
  13  FE       *      0.025+- 0.005    0.074+- 0.016    0.065+- 0.024  2.611+-2.701  FE
  14  NI       *      0.006+- 0.001    0.017+- 0.004    0.007+- 0.002  1.135+-0.395  NI
  15  CU              0.002+- 0.001    0.007+- 0.004    0.000+- 0.000  0.063+-0.123  CU
  16  ZN       *      0.034+- 0.005    0.101+- 0.017    0.034+- 0.011  1.000+-0.445  ZN
  17  AS                    <  0.127          <  0.374  0.000+- 0.000  0.000+-0.000  AS
  18  BR       *      0.066+- 0.008    0.194+- 0.030    0.072+- 0.024  1.095+-0.547  BR
  19  SR                    <  0.029          <  0.085  0.000+- 0.000  0.000+-0.000  SR
  20  CD                    <  0.183          <  0.539  0.000+- 0.000  0.000+-0.000. CD
  21  PB       *      0.203+- 0.024    0.597+- 0.093    0.186+- 0.028  0.916+-0.185  PB
  22  OC       *     13.840+- 2.160   40.729+- 7.571   14.315+- 3.989  1.034+-0.415  OC
  23  EC       *      3.990+- 0.830   11.742+- 2.715    4.049+- 2.430  1.015+-0.868  EC
 ---------------------------------------------------------------------------------
MEAS. AMB  MASS (UG/M3):  FINE:  34.0+- 3.4
```

```
CMBDEQ RESULTS FOR CMB # 010155
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 302   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 23 HRS. WITH START HOUR:  7
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.956 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG     UG/M3                %
 -------------------------------------------------------------------------------
  1    RESWD   *  22.358+- 6.352   76.179+-22.977
  4    TRANS   *   1.954+- 0.328    6.656+- 1.306
  5    RDOIL   *   0.123+- 0.030    0.420+- 0.110
  8    RDUST   *   1.033+- 0.108    3.521+- 0.513
 11    MARIN   *   0.410+- 0.084    1.395+- 0.319
 18    SECSO   *   5.529+- 0.818   18.840+- 3.376
 19    GALVN   *   0.041+- 0.013    0.139+- 0.047
 -------------------------------------------------------------------------------
       TOTAL:     31.448+- 6.415  107.151+-24.401

 SPECIE     FIT           FINE  SUSPENDED PARTICULATE
 CODE       FLG     MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 -------------------------------------------------------------------------------
   1  NA      *     0.187+- 0.027    0.637+- 0.112    0.187+- 0.019  0.999+-0.147  NA
   2  MG                  <  0.200          <  0.681    0.066+- 0.022  0.000+-0.000  MG
   3  AL      *     0.169+- 0.021    0.577+- 0.093    0.123+- 0.009  0.726+-0.067  AL
   4  SI      *     0.252+- 0.029    0.858+- 0.132    0.295+- 0.019  1.173+-0.116  SI
   5  P             0.097+- 0.012    0.330+- 0.052    0.003+- 0.000  0.036+-0.004  P
   6  S       *     1.976+- 0.229    6.732+- 1.035    1.976+- 0.142  1.000+-0.102  S
   7  CL                  <  0.235          <  0.801    0.324+- 0.122  0.000+-0.000  CL
   8  K       *     0.164+- 0.020    0.560+- 0.089    0.206+- 0.157  1.253+-1.527  K
   9  CA            0.027+- 0.005    0.093+- 0.018    0.054+- 0.033  1.994+-2.709 .CA
  10  TI      *     0.008+- 0.002    0.028+- 0.006    0.011+- 0.007  1.350+-1.502  TI
  11  V       *     0.005+- 0.001    0.016+- 0.004    0.005+- 0.001  0.969+-0.278  V
  12  MN            0.007+- 0.001    0.026+- 0.005    0.002+- 0.000  0.207+-0.037  MN
  13  FE      *     0.102+- 0.013    0.349+- 0.057    0.091+- 0.035  0.892+-0.460  FE
  14  NI      *     0.006+- 0.001    0.022+- 0.006    0.007+- 0.002  1.033+-0.340  NI
  15  CU            0.014+- 0.002    0.048+- 0.010    0.000+- 0.000  0.012+-0.017  CU
  16  ZN      *     0.044+- 0.006    0.149+- 0.024    0.044+- 0.009  1.000+-0.279  ZN
  17  AS            0.054+- 0.010    0.185+- 0.038    0.000+- 0.000  0.000+-0.004  AS
  18  BR      *     0.080+- 0.009    0.272+- 0.042    0.105+- 0.035  1.313+-0.731  BR
  19  SR                  <  0.028          <  0.096    0.000+- 0.000  0.000+-0.000  SR
  20  CD                  <  0.164          <  0.560    0.000+- 0.001  0.000+-0.000  CD
  21  PB      *     0.295+- 0.034    1.004+- 0.155    0.271+- 0.040  0.919+-0.186  PB
  22  OC      *    10.840+- 1.720   36.935+- 6.952   11.475+- 3.090  1.059+-0.415  OC
  23  EC      *     4.180+- 0.870   14.242+- 3.296    3.372+- 1.887  0.807+-0.580  EC
 -------------------------------------------------------------------------------
MEAS  AMB. MASS (UG/M3):  FINE:  29.3+- 3.0
```

```
CMBDEQ RESULTS FOR CMB # 010157
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 305   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 14 HRS. WITH START HOUR: 16
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.623 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG     UG/M3                %
 -----------------------------------------------------------------------------------------
  1   RESWD   *  29.877+- 8.373   86.914+-25.939
  4   TRANS   *   1.531+- 0.256    4.453+- 0.874
  5   RDOIL   *   0.030+- 0.022    0.087+- 0.065
  8   RDUST   *   0.510+- 0.066    1.483+- 0.245
 11   MARIN   *   0.202+- 0.058    0.589+- 0.181
 18   SECSO   *   2.196+- 0.455    6.390+- 1.477
 -----------------------------------------------------------------------------------------
      TOTAL:     34.346+- 8.390   99.916+-26.471

 SPECIE     FIT            FINE  SUSPENDED PARTICULATE
 CODE       FLG     MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 -----------------------------------------------------------------------------------------
   1  NA      *      0.107+- 0.016   0.311+- 0.055    0.107+- 0.016  1.000+-0.211   NA
   2  MG             0.012+- 0.009   0.034+- 0.026    0.051+- 0.025  4.340+-9.311   MG
   3  AL      *      0.095+- 0.016   0.275+- 0.055    0.065+- 0.007  0.689+-0.094   AL
   4  SI      *      0.134+- 0.017   0.391+- 0.064    0.149+- 0.010  1.106+-0.107   SI
   5  P              0.059+- 0.008   0.171+- 0.030    0.002+- 0.000  0.029+-0.006   P
   6  S       *      0.852+- 0.107   2.478+- 0.403    0.852+- 0.104  1.000+-0.172   S
   7  CL             0.101+- 0.020   0.294+- 0.066    0.269+- 0.154  2.665+-4.336   CL
   8  K       *      0.196+- 0.025   0.570+- 0.094    0.264+- 0.209  1.345+-1.788   K
   9  CA             0.026+- 0.005   0.074+- 0.018    0.046+- 0.030  1.783+-2.375   CA
  10  TI      *      0.005+- 0.002   0.013+- 0.005    0.007+- 0.006  1.560+-2.286   TI
  11  V                    <  0.011         <  0.032  0.001+- 0.000  0.000+-0.000   V
  12  MN             0.004+- 0.001   0.013+- 0.005    0.001+- 0.000  0.171+-0.071   MN
  13  FE      *      0.050+- 0.008   0.146+- 0.029    0.055+- 0.027  1.089+-0.808   FE
  14  NI      *      0.002+- 0.001   0.005+- 0.003    0.002+- 0.000  0.998+-0.414   NI
  15  CU             0.004+- 0.002   0.013+- 0.006    0.000+- 0.000  0.014+-0.067   CU
  16  ZN             0.023+- 0.004   0.068+- 0.013    0.013+- 0.011  0.548+-0.545   ZN
  17  AS             0.010+- 0.008   0.030+- 0.024    0.000+- 0.000  0.000+-0.029   AS
  18  BR      *      0.093+- 0.011   0.271+- 0.043    0.082+- 0.028  0.880+-0.397   BR
  19  SR                   <  0.026         <  0.075  0.000+- 0.000  0.000+-0.000   SR
  20  CD                   <  0.162         <  0.472  0.000+- 0.000  0.000+-0.000   CD
  21  PB      *      0.209+- 0.026   0.608+- 0.097    0.212+- 0.032  1.014+-0.216   PB
  22  OC      *     14.600+- 2.260  42.473+- 7.886   14.854+- 4.125  1.017+-0.403   OC
  23  EC      *      4.180+- 0.890  12.160+- 2.874    4.224+- 2.514  1.011+-0.855   EC
 -----------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  34.4+- 3.5
```

```
CMBDEQ RESULTS FOR CMB # 010159
 FIHE  PARTICULATE FRACTION
 SAMPLIHG DATE: 81 306   SITE: SITE 3   SITE CODE: 0000003
SAMPLIHG DURATIOH:  8 HRS. WITH START HOUR:  7
BACKGROUHD SITE SUBTRACTED: HO
 EFFECTIVE VARIAHCE FITTIHG.  REDUCED CHI SQUARE:   0.359 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG      UG/M3               %
---------------------------------------------------------------------------------------------
  1    RESWD    *    8.207+- 2.611   69.719+-24.430
  4    TRAHS    *    1.367+- 0.241   11.608+- 2.664
  5    RDOIL    *    0.078+- 0.045    0.664+- 0.392
  8    RDUST    *    0.669+- 0.088    5.679+- 1.118
 11    MARIH    *    0.239+- 0.048    2.031+- 0.502
 18    SECSO    *    1.476+- 0.342   12.535+- 3.440
--------------------------------------------------------------------------------------------
     TOTAL:        12.035+- 2.647  102.236+-27.035

SPECIE       FIT
CODE         FLG              FIHE  SUSPENDED PARTICULATE
                     MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
-------------------------------------------------------------------------------------------
  1  HA         *     0.105+- 0.016    0.894+- 0.187
  2  MG               0.022+- 0.011    0.189+- 0.097    0.105+- 0.010   1.000+-0.139  HA
  3  AL         *     0.084+- 0.019    0.714+- 0.190    0.038+- 0.012   1.694+-1.076  MG
  4  SI         *     0.193+- 0.025    1.636+- 0.322    0.078+- 0.006   0.933+-0.090  AL
  5  P                0.034+- 0.007    0.285+- 0.075    0.192+- 0.012   0.995+-0.090  SI
  6  S          *     0.576+- 0.084    4.895+- 1.015    0.002+- 0.000   0.066+-0.007  P
  7  CL               0.018+- 0.017    0.156+- 0.147    0.576+- 0.074   1.000+-0.182  S
  8  K          *     0.089+- 0.015    0.755+- 0.168    0.170+- 0.049   9.223+-$24.8  CL
  9  CA               0.031+- 0.007    0.266+- 0.073    0.079+- 0.057   0.888+-0.864  K
 10  TI         *     0.006+- 0.003    0.052+- 0.023    0.032+- 0.022   1.017+-0.992  CA
 11  V                      <  0.011          <  0.093  0.007+- 0.005   1.213+-1.305  TI
 12  MH               0.003+- 0.002    0.028+- 0.018    0.003+- 0.001   0.000+-0.000  V
 13  FE         *     0.039+- 0.009    0.334+- 0.094    0.001+- 0.000   0.304+-0.041  MH
 14  HI         *     0.004+- 0.002    0.037+- 0.019    0.061+- 0.025   1.551+-1.154  FE
 15  CU                     <  0.021          <  0.180  0.004+- 0.001   0.974+-0.308  HI
 16  ZH               0.009+- 0.003    0.079+- 0.026    0.000+- 0.000   0.000+-0.000  CU
 17  AS                     <  0.082          <  0.698  0.005+- 0.003   0.523+-0.398  ZH
 18  BR         *     0.062+- 0.008    0.523+- 0.104    0.000+- 0.000   0.000+-0.000  AS
 19  SR                     <  0.026          <  0.218  0.073+- 0.025   1.188+-0.624  BR
 20  CD                     <  0.142          <  1.205  0.000+- 0.000   0.000+-0.000  SR
 21  PB         *     0.208+- 0.027    1.764+- 0.348    0.000+- 0.000   0.000+-0.000  CD
 22  OC         *     3.840+- 0.910   32.619+- 9.094    0.189+- 0.028   0.912+-0.184  PB
 23  EC         *     2.150+- 0.550   18.263+- 5.387    4.496+- 1.139   1.171+-0.457  OC
                                                        1.408+- 0.702   0.655+-0.390  EC
---------------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FIHE:  11.8+- 1.7
```

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CMBDEQ RESULTS FOR CMB # 010165
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 308   SITE: SITE 3   SITE CODE: 0000003
SAMPLING DURATION: 13 HRS. WITH START HOUR: 16
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.370 DEGREES OF FREEDOM:   6
 CODE SOURCE FLG     UG/M3              %
 ----------------------------------------------------------------------------------------
  1    RESWD   *  39.281+-10.952   97.229+-28.865
  4    TRANS   *   1.235+- 0.212    3.058+- 0.610
  5    RDOIL   *   0.038+- 0.020    0.093+- 0.050
  8    RDUST   *   0.426+- 0.059    1.054+- 0.182
 11    MARIN   *   0.323+- 0.084    0.799+- 0.224
 18    SECSO   *   1.505+- 0.406    3.725+- 1.075
 ----------------------------------------------------------------------------------------
       TOTAL:     42.807+-10.963  105.958+-29.206

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3        PERCENT          CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------------
   1  NA      *      0.163+- 0.024   0.404+- 0.071    0.163+- 0.022  1.000+-0.1933  NA
   2  MG             0.010+- 0.009   0.025+- 0.022    0.060+- 0.030  6.086+-$18.88  MG
   3  AL      *      0.068+- 0.014   0.169+- 0.038    0.058+- 0.009  0.845+-0.1666  AL
   4  SI      *      0.121+- 0.016   0.300+- 0.050    0.124+- 0.008  1.025+-0.0955  SI
   5  P              0.053+- 0.008   0.131+- 0.023    0.001+- 0.000  0.027+-0.0088  P
   6  S       *      0.634+- 0.083   1.569+- 0.261    0.634+- 0.103  1.000+-0.2300  S
   7  CL             0.071+- 0.017   0.176+- 0.046    0.358+- 0.203  5.032+-$14.66  CL
   8  K       *      0.253+- 0.032   0.627+- 0.101    0.346+- 0.275  1.363+-1.8355  K
   9  CA             0.014+- 0.004   0.035+- 0.012    0.050+- 0.030  3.466+-7.6633  CA
  10  TI             0.001+- 0.001   0.003+- 0.003    0.006+- 0.005  4.192+-$14.11  TI
  11  V       *      0.002+- 0.001   0.005+- 0.003    0.001+- 0.000  0.663+-0.2655  V
  12  MN             0.002+- 0.001   0.005+- 0.003    0.001+- 0.000  0.317+-0.2099  MN
  13  FE      *      0.023+- 0.006   0.056+- 0.015    0.045+- 0.022  1.992+-2.1766  FE
  14  NI      *      0.002+- 0.001   0.004+- 0.003    0.002+- 0.001  1.258+-0.6033  NI
  15  CU             0.005+- 0.002   0.012+- 0.005    0.000+- 0.000  0.013+-0.0822  CU
  16  ZN             0.025+- 0.004   0.061+- 0.011    0.016+- 0.015  0.647+-0.7033  ZN
  17  AS             0.013+- 0.008   0.032+- 0.020    0.000+- 0.000  0.000+-0.0311  AS
  18  BR      *      0.071+- 0.009   0.176+- 0.028    0.066+- 0.022  0.935+-0.4311  BR
  19  SR                   < 0.026         < 0.065    0.000+- 0.000  0.000+-0.0000  SR
  20  CD                   < 0.155         < 0.383    0.000+- 0.000  0.000+-0.0000  CD
  21  PB      *      0.174+- 0.022   0.431+- 0.070    0.171+- 0.026  0.982+-0.2066  PB
  22  OC      *     20.560+- 3.050  50.891+- 9.160   19.195+- 5.422  0.934+-0.3611  OC
  23  EC      *      4.010+- 0.860   9.926+- 2.357    5.351+- 3.302  1.334+-1.3733  EC
 ----------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  40.4+- 4.1
```

```
                                                   PAGE 0036


CMBDEQ RESULTS FOR CMB # 010173
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 309   SITE: SITE 4   SITE CODE: 0000004
SAMPLING DURATION: 24 HRS. WITH START HOUR: 16
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.554 DEGREES OF FREEDOM:  8
 CODE SOURCE FLG      UG/M3                %
 -----------------------------------------------------------------------------------
  1    RESWD   *   9.431+- 2.836   77.459+-24.721
  4    TRANS   *   1.160+- 0.197    9.526+- 1.910
  5    RDOIL   *   0.042+- 0.017    0.343+- 0.143
  8    RDUST   *   0.870+- 0.089    7.143+- 1.055
 11    MARIN   *   0.346+- 0.065    2.840+- 0.612
 18    SECSO   *   1.822+- 0.328   14.967+- 3.137
 -----------------------------------------------------------------------------------
       TOTAL:     13.671+- 2.864  112.278+-26.409

 SPECIE       FIT           FINE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS. UG/M3          PERCENT         CALC. UG/M3        RATIO
 -----------------------------------------------------------------------------------
   1  NA        *     0.148+- 0.021    1.218+- 0.218    0.148+- 0.015  0.995+-0.138  NA
   2  MG              0.019+- 0.007    0.160+- 0.064    0.045+- 0.012  2.287+-1.477  MG
   3  AL        *     0.110+- 0.015    0.900+- 0.154    0.101+- 0.007  0.917+-0.085  AL
   4  SI        *     0.235+- 0.027    1.933+- 0.306    0.245+- 0.016  1.041+-0.096  SI
   5  P               0.041+- 0.006    0.340+- 0.059    0.003+- 0.000  0.070+-0.007  P
   6  S         *     0.684+- 0.084    5.620+- 0.914    0.684+- 0.068  1.000+-0.141  S
   7  CL                   <  0.159           <  1.305  0.214+- 0.060  0.000+-0.000  CL
   8  K         *     0.084+- 0.011    0.687+- 0.118    0.092+- 0.066  1.104+-1.177  K
   9  CA        *     0.024+- 0.004    0.200+- 0.040    0.033+- 0.019  1.349+-1.299  CA
  10  TI        *     0.005+- 0.001    0.038+- 0.012    0.008+- 0.004  1.649+-1.805  TI
  11  V         *     0.001+- 0.001    0.012+- 0.007    0.002+- 0.000  1.184+-0.349  V
  12  MN              0.003+- 0.001    0.025+- 0.009    0.001+- 0.000  0.412+-0.055  MN
  13  FE        *     0.064+- 0.009    0.523+- 0.091    0.066+- 0.021  1.038+-0.474  FE
  14  NI        *     0.003+- 0.001    0.021+- 0.009    0.002+- 0.001  0.860+-0.261  NI
  15  CU              0.009+- 0.002    0.073+- 0.016    0.000+- 0.000  0.011+-0.012  CU
  16  ZN              0.021+- 0.003    0.169+- 0.031    0.005+- 0.004  0.246+-0.182  ZN
  17  AS              0.031+- 0.007    0.255+- 0.063    0.000+- 0.000  0.000+-0.003  AS
  18  BR        *     0.047+- 0.006    0.384+- 0.062    0.062+- 0.021  1.333+-0.748  BR
  19  SR              0.002+- 0.001    0.017+- 0.011    0.000+- 0.000  0.086+-0.059  SR
  20  CD                   <  0.186           <  1.529  0.000+- 0.000  0.000+-0.000  CD
  21  PB        *     0.179+- 0.021    1.468+- 0.235    0.161+- 0.024  0.901+-0.181  PB
  22  OC        *     4.170+- 0.870   34.248+- 8.030    4.984+- 1.305  1.195+-0.488  OC
  23  EC        *     2.980+- 0.630   24.475+- 5.799    1.510+- 0.800  0.507+-0.301  EC
 -----------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  12.2+- 1.3
```

```
CMBDED RESULTS FOR CMB # 010082
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 130   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 22 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.638 DEGREES OF FREEDOM:  8
 CODE SOURCE FLG      UG/M3               %
----------------------------------------------------------------------------------------
  1    RESWD    *   31.755+- 8.695   63.571+-18.543
  4    TRANS    *    2.240+- 0.369    4.484+- 0.865
  5    RDOIL    *    0.274+- 0.056    0.549+- 0.125
  7    RDUST    *    0.772+- 0.098    1.545+- 0.250
 11    MARIN    *    0.370+- 0.088    0.741+- 0.191
 18    SECSO    *    2.554+- 0.561    5.113+- 1.235
 19    GALVN    *    0.024+- 0.016    0.047+- 0.033
----------------------------------------------------------------------------------------
       TOTAL:       37.988+- 8.722   76.050+-19.061

SPECIE      FIT             FINE  SUSPENDED PARTICULATE
CODE        FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3       RATIO
----------------------------------------------------------------------------------------
  1  NA      *       0.190+- 0.027    0.380+- 0.067    0.194+- 0.021  1.020+-0.161  NA
  2  MG              0.033+- 0.014    0.067+- 0.029    0.070+- 0.030  2.097+-2.075  MG
  3  AL      *       0.133+- 0.018    0.267+- 0.045    0.079+- 0.022  0.595+-0.192  AL
  4  SI      *       0.175+- 0.021    0.351+- 0.055    0.188+- 0.010  1.073+-0.083  SI
  5  P               0.076+- 0.009    0.152+- 0.024    0.000+- 0.000  0.000+-0.004  P
  6  S       *       1.040+- 0.124    2.082+- 0.325    1.040+- 0.135  1.000+-0.184  S
  7  CL      *       0.469+- 0.057    0.939+- 0.149    0.362+- 0.167  0.772+-0.449  CL
  8  K       *       0.417+- 0.049    0.835+- 0.129    0.287+- 0.222  0.688+-0.647  K
  9  CA              0.026+- 0.005    0.053+- 0.012    0.076+- 0.040  2.861+-4.549  CA
 10  TI      *       0.011+- 0.002    0.022+- 0.005    0.012+- 0.008  1.128+-1.144  TI
 11  V       *       0.009+- 0.002    0.018+- 0.004    0.010+- 0.002  1.068+-0.338  V
 12  MN              0.003+- 0.001    0.005+- 0.002    0.001+- 0.000  0.414+-0.144  MN
 13  FE      *       0.095+- 0.012    0.190+- 0.031    0.096+- 0.040  1.009+-0.604  FE
 14  NI      *       0.016+- 0.003    0.031+- 0.006    0.015+- 0.003  0.936+-0.291  NI
 15  CU              0.026+- 0.004    0.051+- 0.009    0.000+- 0.000  0.017+-0.013  CU
 16  ZN      *       0.035+- 0.005    0.069+- 0.012    0.035+- 0.012  1.000+-0.488  ZN
 17  AS                    <  0.151           <  0.303  0.000+- 0.000  0.000+-0.000  AS
 18  BR      *       0.128+- 0.015    0.256+- 0.039    0.120+- 0.041  0.939+-0.435  BR
 19  SR                    <  0.031           <  0.062  0.000+- 0.000  0.000+-0.000  SR
 20  CD              0.015+- 0.010    0.030+- 0.020    0.000+- 0.000  0.000+-0.022  CD
 21  PB      *       0.309+- 0.036    0.619+- 0.095    0.312+- 0.046  1.011+-0.213  PB
 22  OC      *      13.350+- 2.280   26.726+- 5.296   16.182+- 4.387  1.212+-0.516  OC
 23  EC      *       4.910+- 1.020    9.830+- 2.268    4.650+- 2.676  0.947+-0.751  EC
----------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  50.0+- 5.0
```

```
CMBDEQ RESULTS FOR CMB # 010084
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 131    SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.675 DEGREES OF FREEDOM:  8
 CODE SOURCE FLG      UG/M3              %
 ----------------------------------------------------------------------------------
  1    RESWD    *  53.140+-14.310   75.405+-21.670
  4    TRANS    *   2.727+- 0.455    3.870+- 0.753
  5    RDOIL    *   0.161+- 0.040    0.228+- 0.061
  7    RDUST    *   0.736+- 0.100    1.044+- 0.176
 11    MARIN    *   0.230+- 0.091    0.327+- 0.134
 13    SECSO    *   2.077+- 0.640    2.947+- 0.956
 ----------------------------------------------------------------------------------
       TOTAL:      59.071+-14.332   83.821+-22.008

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT          CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------
   1  NA.     *      0.151+- 0.022   0.214+- 0.038     0.151+- 0.026  1.000+-0.247  NA
   2  MG                  <  0.225          <  0.320     0.083+- 0.044  0.000+-0.000  MG
   3  AL      *      0.115+- 0.017   0.163+- 0.029     0.081+- 0.023  0.703+-0.243  AL
   4  SI      *      0.174+- 0.021   0.247+- 0.039     0.182+- 0.010  1.044+-0.084  SI
   5  P              0.081+- 0.010   0.115+- 0.019     0.000+- 0.001  0.000+-0.007  P
   6  S       *      0.921+- 0.114   1.306+- 0.208     0.921+- 0.175  1.000+-0.270  S
   7  CL      *      0.427+- 0.054   0.606+- 0.098     0.427+- 0.272  0.999+-0.902  CL
   8  K       *      0.316+- 0.038   0.449+- 0.070     0.468+- 0.372  1.481+-2.103  K
   9  CA             0.021+- 0.005   0.030+- 0.007     0.091+- 0.053  4.365+-$11.3  CA
  10  TI             0.004+- 0.002   0.006+- 0.002     0.014+- 0.010  3.166+-7.831  TI
  11  V       *      0.004+- 0.001   0.006+- 0.002     0.006+- 0.001  1.388+-0.550  V
  12  MN                  <  0.022          <  0.031     0.001+- 0.001  0.000+-0.000  MN
  13  FE      *      0.055+- 0.008   0.078+- 0.014     0.099+- 0.049  1.810+-1.347  FE
  14  NI      *      0.011+- 0.002   0.016+- 0.004     0.009+- 0.002  0.762+-0.224  NI
  15  CU             0.020+- 0.003   0.029+- 0.005     0.000+- 0.001  0.017+-0.027  CU
  16  ZN      *      0.029+- 0.004   0.042+- 0.007     0.024+- 0.020  0.802+-0.864  ZN
  17  AS                  <  0.154          <  0.219     0.000+- 0.001  0.000+-0.000  AS
  18  BR      *      0.160+- 0.018   0.227+- 0.035     0.146+- 0.049  0.912+-0.418  BR
  19  SR                  <  0.031          <  0.044     0.000+- 0.001  0.000+-0.000  SR
  20  CD             0.013+- 0.012   0.018+- 0.017     0.000+- 0.001  0.000+-0.042  CD
  21  PB      *      0.381+- 0.044   0.540+- 0.083     0.379+- 0.056  0.996+-0.209  PB
  22  OC      *     22.190+- 4.240  31.487+- 6.796    26.534+- 7.337  1.196+-0.515  OC
  23  EC      *     12.750+- 2.630  18.092+- 4.150     7.514+- 4.472  0.589+-0.407  EC
 ----------------------------------------------------------------------------------
MEAS  AMB. MASS (UG/M3):  FINE:  70.5+- 7.1
```

```
CMBDEQ RESULTS FOR CMB # 010086
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 201   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.636 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG      UG/M3                %
 ------------------------------------------------------------------------------------
  1    RESWD    *  55.548+-13.137  118.592+-30.474
  4    TRANS    *   1.443+- 0.244    3.081+- 0.607
  5    RDOIL    *   0.257+- 0.053    0.550+- 0.125
  7    RDUST    *   0.492+- 0.067    1.050+- 0.178
 18    SECSO    *   2.229+- 0.542    4.759+- 1.253
 ------------------------------------------------------------------------------------
       TOTAL:      59.970+-13.150  128.032+-30.884

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA       *      0.081+- 0.012   0.172+- 0.031     0.061+- 0.026  0.759+-0.404   NA
   2  MG                    <  0.239          <  0.511     0.059+- 0.043  0.000+-0.000   MG
   3  AL       *      0.095+- 0.014   0.202+- 0.035     0.059+- 0.017  0.618+-0.217   AL
   4  SI       *      0.115+- 0.014   0.246+- 0.039     0.121+- 0.006  1.048+-0.081   SI
   5  P               0.060+- 0.008   0.128+- 0.021     0.000+- 0.001  0.000+-0.009   P
   6  S        *      0.929+- 0.111   1.984+- 0.310     0.929+- 0.138  1.000+-0.209   S
   7  CL       *      0.221+- 0.030   0.473+- 0.079     0.317+- 0.283  1.430+-2.229   CL
   8  K        *      0.381+- 0.045   0.814+- 0.126     0.484+- 0.389  1.268+-1.647   K
   9  CA              0.012+- 0.004   0.026+- 0.008     0.070+- 0.040  5.799+-$19.5   CA
  10  TI              0.003+- 0.001   0.006+- 0.003     0.008+- 0.005  3.096+-6.758   TI
  11  V        *      0.009+- 0.002   0.020+- 0.004     0.009+- 0.002  0.944+-0.291   V
  12  MN              0.001+- 0.001   0.003+- 0.002     0.001+- 0.001  0.603+-0.548   MN
  13  FE       *      0.033+- 0.005   0.071+- 0.014     0.064+- 0.026  1.912+-1.683   FE
  14  NI       *      0.013+- 0.002   0.028+- 0.006     0.014+- 0.003  1.053+-0.351   NI
  15  CU              0.020+- 0.003   0.044+- 0.008     0.000+- 0.001  0.017+-0.027   CU
  16  ZN       *      0.030+- 0.004   0.063+- 0.011     0.023+- 0.021  0.789+-0.883   ZN
  17  AS                    <  0.128          <  0.273     0.000+- 0.001  0.000+-0.000   AS
  18  BR       *      0.081+- 0.010   0.174+- 0.027     0.077+- 0.026  0.946+-0.442   BR
  19  SR                    <  0.030          <  0.064     0.000+- 0.001  0.000+-0.000   SR
  20  CD                    <  0.184          <  0.392     0.000+- 0.001  0.000+-0.000   CD
  21  PB       *      0.208+- 0.025   0.443+- 0.069     0.201+- 0.030  0.969+-0.200   PB
  22  OC       *     20.990+- 3.610  44.813+- 8.927    27.101+- 7.667  1.291+-0.596   OC
  23  EC       *     10.030+- 2.070  21.414+- 4.916     7.487+- 4.668  0.746+-0.581   EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  46.8+- 4.7
```

```
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  CMBDED RESULTS FOR CMB # 010088
   FINE  PARTICULATE FRACTION
   SAMPLING DATE: 81 202    SITE: SITE 5   SITE CODE: 0000005
  SAMPLING DURATION: 24 HRS. WITH START HOUR: 17
  BACKGROUND SITE SUBTRACTED: NO
   EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.996 DEGREES OF FREEDOM:  7
   CODE SOURCE FLG      UG/M3                  %
   ---------------------------------------------------------------------------------------
    1     RESWD    *   13.757+- 3.970   51.015+-15.607
    4     TRANS    *    1.196+- 0.205    4.436+- 0.884
    5     RDOIL    *    0.084+- 0.023    0.310+- 0.090
    7     RDUST    *    0.762+- 0.091    2.825+- 0.443
   11     MARIN    *    0.137+- 0.037    0.506+- 0.147
   18     SECSO    *    3.198+- 0.486   11.858+- 2.166
   19     GALVN    *    0.016+- 0.008    0.060+- 0.029
   ---------------------------------------------------------------------------------------
          TOTAL:       19.149+- 4.006   71.010+-16.513

   SPECIE       FIT             FINE  SUSPENDED PARTICULATE
   CODE         FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
   ---------------------------------------------------------------------------------------
     1   NA      *      0.078+- 0.011    0.291+- 0.052    0.078+- 0.009  1.000+-0.160  NA
     2   MG             0.011+- 0.007    0.042+- 0.028    0.037+- 0.014  3.227+-4.098  MG
     3   AL      *      0.120+- 0.016    0.445+- 0.074    0.072+- 0.021  0.603+-0.203  AL
     4   SI      *      0.171+- 0.020    0.633+- 0.099    0.178+- 0.009  1.042+-0.074  SI
     5   P              0.058+- 0.007    0.215+- 0.035    0.000+- 0.000  0.000+-0.002  P
     6   S       *      1.146+- 0.135    4.248+- 0.662    1.146+- 0.085  1.000+-0.105  S
     7   CL             0.066+- 0.014    0.245+- 0.056    0.153+- 0.072  2.311+-2.741  CL
     8   K       *      0.138+- 0.017    0.514+- 0.083    0.128+- 0.096  0.926+-0.948  K
     9   CA             0.027+- 0.004    0.099+- 0.019    0.045+- 0.021  1.687+-1.508  CA
    10   TI      *      0.004+- 0.001    0.016+- 0.005    0.009+- 0.005  1.999+-2.297  TI
    11   V       *      0.002+- 0.001    0.009+- 0.003    0.003+- 0.001  1.326+-0.465  V
    12   MN             0.003+- 0.001    0.011+- 0.004    0.001+- 0.000  0.325+-0.067  MN
    13   FE      *      0.059+- 0.008    0.220+- 0.038    0.070+- 0.022  1.188+-0.574  FE
    14   NI      *      0.006+- 0.001    0.021+- 0.006    0.004+- 0.001  0.786+-0.228  NI
    15   CU             0.006+- 0.002    0.024+- 0.006    0.000+- 0.000  0.045+-0.026  CU
    16   ZN      *      0.020+- 0.003    0.076+- 0.013    0.020+- 0.005  1.000+-0.364  ZN
    17   AS                   <  0.119          <  0.441    0.000+- 0.000  0.000+-0.000  AS
    18   BR      *      0.055+- 0.007    0.205+- 0.032    0.064+- 0.022  1.161+-0.601  BR
    19   SR                   <  0.028          <  0.102    0.000+- 0.000  0.000+-0.000  SR
    20   CD                   <  0.175          <  0.647    0.000+- 0.000  0.000+-0.000  CD
    21   PB      *      0.184+- 0.022    0.682+- 0.107    0.168+- 0.025  0.913+-0.183  PB
    22   OC      *      6.020+- 1.090   22.324+- 4.634    7.163+- 1.902  1.190+-0.491  OC
    23   EC      *      3.330+- 0.700   12.349+- 2.883    2.073+- 1.161  0.623+-0.411  EC
  ---------------------------------------------------------------------------------------
  MEAS. AMB. MASS (UG/M3):  FINE:  27.0+- 2.7
```

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```
CMBDEQ RESULTS FOR CMB # 010094
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 205   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.681 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG     UG/M3               %
 ------------------------------------------------------------------------------------
  1    RESWD   *  17.187+- 4.951   48.374+-14.766
  4    TRANS   *   1.370+- 0.236    3.855+- 0.769
  5    RDOIL   *   0.872+- 0.159    2.455+- 0.512
  7    RDUST   *   0.949+- 0.132    2.670+- 0.459
 11    MARIN   *   0.324+- 0.092    0.912+- 0.274
 14    ALUMP   *   0.318+- 0.165    0.894+- 0.472
 18    SEC30   *   4.903+- 0.737   13.799+- 2.498
 19    GALVN   *   0.061+- 0.013    0.172+- 0.041
 ------------------------------------------------------------------------------------
       TOTAL:     25.982+- 5.019   73.130+-15.938

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT         CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA       *     0.213+- 0.031    0.601+- 0.106     0.199+- 0.022   0.933+-0.142  NA
   2  MG                   < 0.352           < 0.990     0.061+- 0.032   0.000+-0.000  MG
   3  AL       *     0.179+- 0.022    0.503+- 0.081     0.180+- 0.036   1.005+-0.289  AL
   4  SI       *     0.241+- 0.028    0.679+- 0.105     0.229+- 0.012   0.950+-0.067  SI
   5  P              0.088+- 0.011    0.247+- 0.039     0.000+- 0.000   0.000+-0.002  P
   6  S        *     1.837+- 0.213    5.172+- 0.795     1.837+- 0.115   1.000+-0.088  S
   7  CL       *     0.154+- 0.023    0.434+- 0.079     0.253+- 0.094   1.643+-1.171  CL
   8  K        *     0.187+- 0.023    0.525+- 0.083     0.165+- 0.120   0.886+-0.861  K
   9  CA             0.061+- 0.008    0.172+- 0.029     0.070+- 0.025   1.146+-0.611  CA
  10  TI       *     0.005+- 0.002    0.015+- 0.005     0.012+- 0.005   2.098+-2.201  TI
  11  V        *     0.031+- 0.004    0.086+- 0.014     0.030+- 0.007   0.994+-0.302  V
  12  MN             0.017+- 0.002    0.048+- 0.009     0.002+- 0.000   0.093+-0.016  MN
  13  FE       *     0.091+- 0.012    0.256+- 0.042     0.110+- 0.026   1.204+-0.443  FE
  14  NI       *     0.049+- 0.006    0.137+- 0.023     0.047+- 0.011   0.972+-0.302  NI
  15  CU             0.014+- 0.002    0.040+- 0.008     0.001+- 0.000   0.075+-0.021  CU
  16. ZN       *     0.061+- 0.008    0.172+- 0.028     0.061+- 0.007   1.000+-0.164  ZN
  17  AS                   < 0.129           < 0.363     0.000+- 0.000   0.000+-0.000  AS
  18  BR       *     0.067+- 0.008    0.188+- 0.029     0.074+- 0.025   1.105+-0.552  BR
  19  SR                   < 0.029           < 0.081     0.000+- 0.000   0.000+-0.000  SR
  20  CD                   < 0.181           < 0.509     0.000+- 0.000   0.000+-0.000  CD
  21  PB       *     0.212+- 0.025    0.597+- 0.093     0.194+- 0.028   0.912+-0.181  PB
  22  OC       *     8.190+- 1.470   23.052+- 4.747     8.992+- 2.376   1.098+-0.431  OC
  23  EC       *     4.550+- 0.950   12.807+- 2.970     2.558+- 1.450   0.562+-0.366  EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  35.5+- 3.6
```

```
CMBDEQ RESULTS FOR CMB # 010098
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 206   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.276 DEGREES OF FREEDOM:  5
 CODE SOURCE FLG     UG/M3              %
 -----------------------------------------------------------------------------------
  1    RESWD   *  18.867+- 5.359   52.868+-15.936
  4    TRANS   *   1.375+- 0.235    3.853+- 0.764
  5    RDOIL   *   0.188+- 0.041    0.528+- 0.126
  7    RDUST   *   0.725+- 0.100    2.031+- 0.347
 11    MARIN   *   0.425+- 0.093    1.191+- 0.287
 14    ALUMP   *   0.270+- 0.134    0.757+- 0.383
 18    SECSO   *   5.235+- 0.747   14.669+- 2.563
 19    GALVN   *   0.036+- 0.011    0.102+- 0.033
 -----------------------------------------------------------------------------------
       TOTAL:     27.122+- 5.420   75.999+-17.012

 SPECIE      FIT          . FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 -----------------------------------------------------------------------------------
   1   NA       *      0.212+- 0.031   0.595+- 0.105    0.212+- 0.020  1.000+-0.133  NA
   2   MG              0.019+- 0.011   0.053+- 0.030    0.063+- 0.019  3.316+-3.493  MG
   3   AL       *      0.144+- 0.018   0.403+- 0.066    0.144+- 0.030  1.001+-0.290  AL
   4   SI  -    *      0.176+- 0.021   0.495+- 0.077    0.172+- 0.009  0.977+-0.068  SI
   5   P               0.092+- 0.011   0.258+- 0.041    0.000+- 0.000  0.000+-0.002  P
   6   S        *      1.861+- 0.216   5.216+- 0.801    1.861+- 0.118  1.000+-0.090  S
   7   CL              0.141+- 0.022   0.396+- 0.074    0.302+- 0.106  2.137+-1.764  CL
   8   K        *      0.209+- 0.025   0.586+- 0.093    0.177+- 0.132  0.845+-0.826  K
   9   CA              0.020+- 0.004   0.055+- 0.013    0.056+- 0.024  2.840+-3.703  CA
  10   TI              0.003+- 0.001   0.008+- 0.003    0.009+- 0.005  3.340+-6.433  TI
  11   V        *      0.006+- 0.001   0.017+- 0.004    0.007+- 0.001  1.117+-0.351  V
  12   MN              0.002+- 0.001   0.005+- 0.003    0.001+- 0.000  0.530+-0.139  MN
  13   FE       *      0.058+- 0.008   0.162+- 0.028    0.076+- 0.025  1.312+-0.716  FE
  14   NI       *      0.012+- 0.002   0.034+- 0.007    0.011+- 0.002  0.884+-0.256  NI
  15   CU              0.027+- 0.004   0.075+- 0.013    0.000+- 0.000  0.018+-0.008  CU
  16   ZN       *  .   0.039+- 0.005   0.110+- 0.018    0.039+- 0.007  1.000+-0.262  ZN
  17   AS              0.030+- 0.007   0.084+- 0.022    0.000+- 0.000  0.000+-0.007  AS
  18   BR       *      0.066+- 0.008   0.184+- 0.029    0.074+- 0.025  1.129+-0.570  BR
  19   SR                    < 0.028         < 0.077    0.000+- 0.000  0.000+-0.000  SR
  20   CD                    < 0.158         < 0.442    0.000+- 0.000  0.000+-0.000  CD
  21   PB       *      0.204+- 0.024   0.572+- 0.089    0.193+- 0.028  0.943+-0.192  PB
  22   OC       *      8.810+- 1.430  24.687+- 4.718    9.689+- 2.607  1.100+-0.440  OC
  23   EC       *      3.560+- 0.750   9.976+- 2.330    2.774+- 1.590  0.779+-0.566  EC
 -----------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  35.7+- 3.6
```

```
CMBDEQ RESULTS FOR CMB # 010100 .
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 207   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.647 DEGREES OF FREEDOM:   8
 CODE SOURCE FLG      UG/M3                  %
 -----------------------------------------------------------------------------------------
  1    RESWD    *  61.762+-15.707   89.171+-24.375
  4    TRANS    *   2.566+- 0.428    3.705+- 0.721
  5    RDOIL    *   0.035+- 0.019    0.051+- 0.028
  7    RDUST    *   0.677+- 0.094    0.977+- 0.167
 18    SECSO    *   1.349+- 0.606    1.948+- 0.896
 -----------------------------------------------------------------------------------------
       TOTAL:      66.389+-15.725   95.851+-24.651

 SPECIE       FIT            FINE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS. UG/M3         PERCENT          CALC. UG/M3        RATIO
 -----------------------------------------------------------------------------------------
   1   NA      *      0.058+- 0.009    0.083+- 0.015     0.061+- 0.029  1.057+-0.719  NA
   2   MG                   <  0.215          <  0.311     0.076+- 0.049  0.000+-0.000  MG
   3   AL      *      0.088+- 0.014    0.128+- 0.023     0.077+- 0.022  0.865+-0.334  AL
   4   SI      *      0.166+- 0.020    0.240+- 0.037     0.166+- 0.009  0.999+-0.080  SI
   5   P              0.070+- 0.009    0.101+- 0.016     0.000+- 0.001  0.000+-0.009  P
   6   S       *      0.665+- 0.083    0.961+- 0.154     0.665+- 0.179  1.000+-0.380  S
   7   CL             0.464+- 0.057    0.670+- 0.106     0.375+- 0.315  0.807+-0.872  CL
   8   K       *      0.347+- 0.041    0.502+- 0.077     0.538+- 0.432  1.549+-2.295  K
   9   CA             0.022+- 0.004    0.032+- 0.007     0.088+- 0.054  4.003+-$10.1  CA
  10   TI             0.002+- 0.001    0.003+- 0.002     0.013+- 0.010  6.291+-$30.4  TI
  11   V       *      0.001+- 0.001    0.002+- 0.001     0.001+- 0.001  1.249+-0.980  V
  12   MN             0.002+- 0.001    0.003+- 0.001     0.001+- 0.001  0.447+-0.363  MN
  13   FE      *      0.037+- 0.006    0.053+- 0.010     0.089+- 0.046  2.429+-3.300  FE
  14   NI      *      0.002+- 0.001    0.003+- 0.002     0.002+- 0.001  0.825+-0.424  NI
  15   CU             0.014+- 0.002    0.021+- 0.004     0.000+- 0.001  0.016+-0.043  CU
  16   ZN      *      0.028+- 0.004    0.041+- 0.007     0.026+- 0.023  0.924+-1.109  ZN
  17   AS                   <  0.169          <  0.245     0.000+- 0.001  0.000+-0.000  AS
  18   BR      *      0.146+- 0.017    0.210+- 0.032     0.137+- 0.046  0.938+-0.437  BR
  19   SR                   <  0.031          <  0.044     0.000+- 0.001  0.000+-0.000  SR
  20   CD                   <  0.176          <  0.254     0.000+- 0.001  0.000+-0.000  CD
  21   PB      *      0.363+- 0.042    0.524+- 0.080     0.357+- 0.053  0.984+-0.206  PB
  22   OC      *     24.870+- 5.390   35.907+- 8.574    30.539+- 8.526  1.228+-0.543  OC
  23   EC      *     20.000+- 4.130   28.876+- 6.628     3.576+- 5.194  0.429+-0.283  EC
 -----------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  69.3+- 6.9
```

```
CMBDEQ RESULTS FOR CMB # 010102
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 208   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.412 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                   %
 ------------------------------------------------------------------------------------------
  1    RESWD   *  20.318+- 5.584   60.064+-17.585
  4    TRANS   *   0.937+- 0.159    2.771+- 0.548
  5    RDOIL   *   0.231+- 0.048    0.684+- 0.159
  7    RDUST   *   0.388+- 0.058    1.146+- 0.208
 11    MARIN   *   0.211+- 0.059    0.624+- 0.184
 14    ALUMP   *   0.239+- 0.100    0.707+- 0.305
 18    SECSO   *   3.208+- 0.490    9.484+- 1.737
 19    GALVN   *   0.032+- 0.012    0.094+- 0.035
 ------------------------------------------------------------------------------------------
       TOTAL:     25.566+- 5.609   75.576+-18.254

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3         RATIO
 ------------------------------------------------------------------------------------------
   1  NA      *       0.126+- 0.018    0.373+- 0.066     0.124+- 0.014   0.983+-0.154   NA
   2  MG              0.023+- 0.011    0.068+- 0.032     0.045+- 0.018   1.947+-1.753   MG
   3  AL      *       0.105+- 0.014    0.311+- 0.053     0.106+- 0.022   1.005+-0.300   AL
   4  SI      *       0.097+- 0.012    0.288+- 0.046     0.095+- 0.005   0.976+-0.071   SI
   5  P               0.067+- 0.008    0.198+- 0.032     0.000+- 0.000   0.000+-0.003   P
   6  S       *       1.175+- 0.138    3.473+- 0.539     1.175+- 0.083   1.000+-0.099   S
   7  CL      *       0.153+- 0.022    0.452+- 0.080     0.213+- 0.106   1.394+-1.187   CL
   8  K       *       0.292+- 0.035    0.862+- 0.134     0.183+- 0.142   0.627+-0.576   K
   9  CA              0.005+- 0.003    0.016+- 0.008     0.041+- 0.019   7.819+-*28.3   CA
  10  TI      *       0.005+- 0.001    0.015+- 0.005     0.006+- 0.004   1.121+-1.013   TI
  11  V       *       0.007+- 0.001    0.020+- 0.005     0.008+- 0.002   1.243+-0.423   V
  12  MN              0.002+- 0.001    0.007+- 0.003     0.001+- 0.000   0.265+-0.099   MN
  13  FE      *       0.034+- 0.005    0.102+- 0.019     0.049+- 0.017   1.407+-0.851   FE
  14  NI      *       0.016+- 0.003    0.048+- 0.009     0.013+- 0.003   0.789+-0.220   NI
  15  CU              0.018+- 0.003    0.052+- 0.010     0.000+- 0.000   0.022+-0.012   CU
  16  ZN      *       0.035+- 0.005    0.105+- 0.017     0.035+- 0.008   1.000+-0.307   ZN
  17  AS              0.010+- 0.005    0.030+- 0.016     0.000+- 0.000   0.000+-0.020   AS
  18  BR      *       0.052+- 0.006    0.153+- 0.024     0.050+- 0.017   0.978+-0.460   BR
  19  SR                    <  0.026           <  0.078     0.000+- 0.000   0.000+-0.000   SR
  20  CD                    <  0.159           <  0.469     0.000+- 0.000   0.000+-0.000   CD
  21  PB      *       0.135+- 0.016    0.399+- 0.063     0.131+- 0.019   0.971+-0.200   PB
  22  OC      *       9.780+- 1.520   28.911+- 5.359    10.147+- 2.805   1.037+-0.413   OC
  23  EC      *       2.760+- 0.580    8.159+- 1.902     2.846+- 1.709   1.031+-0.889   EC
 ------------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  33.8+- 3.4
```

```
CMBDED RESULTS FOR CMB # 010126
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 211   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.491 DEGREES OF FREEDOM:  8
 CODE SOURCE FLG      UG/M3                   %
 -------------------------------------------------------------------------------------
  1    RESWD    *  32.430+- 8.449   92.465+-25.837
  4    TRANS    *   1.356+- 0.229    3.866+- 0.761
  5    RDOIL    *   0.123+- 0.031    0.350+- 0.095
  7    RDUST    *   0.573+- 0.074    1.635+- 0.268
 11    MARIN    *   0.261+- 0.071    0.744+- 0.216
 18    SEC30    *   1.647+- 0.394    4.697+- 1.219
 -------------------------------------------------------------------------------------
       TOTAL:      36.390+- 8.462  103.755+-26.304

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT         CALC. UG/M3        RATIO
 -------------------------------------------------------------------------------------
   1  NA       *      0.142+- 0.020   0.405+- 0.071     0.143+- 0.018  1.006+-0.184  NA
   2  MG                    < 0.196           < 0.559     0.055+- 0.026  0.000+-0.000  MG
   3  AL       *      0.089+- 0.013   0.253+- 0.045     0.060+- 0.017  0.676+-0.230  AL
   4  SI       *      0.132+- 0.016   0.376+- 0.059     0.137+- 0.007  1.041+-0.077  SI
   5  P               0.053+- 0.007   0.152+- 0.025     0.000+- 0.000  0.000+-0.006  P
   6  S        *      0.683+- 0.084   1.947+- 0.310     0.683+- 0.098  1.000+-0.202  S
   7  CL       *      0.331+- 0.042   0.945+- 0.153     0.301+- 0.167  0.909+-0.683  CL
   8  K        *      0.278+- 0.033   0.792+- 0.124     0.289+- 0.227  1.040+-1.179  K
   9  CA              0.021+- 0.004   0.060+- 0.014     0.057+- 0.029  2.723+-3.970  CA
  10  TI              0.004+- 0.001   0.011+- 0.004     0.008+- 0.005  2.036+-2.877  TI
  11  V        *      0.004+- 0.001   0.011+- 0.004     0.004+- 0.001  1.145+-0.390  V
  12  MN                    < 0.022           < 0.062     0.001+- 0.000  0.000+-0.000  MN
  13  FE       *      0.041+- 0.006   0.118+- 0.022     0.063+- 0.025  1.521+-1.076  FE
  14  NI       *      0.007+- 0.002   0.021+- 0.005     0.007+- 0.002  0.888+-0.275  NI
  15  CU              0.022+- 0.003   0.062+- 0.011     0.000+- 0.000  0.012+-0.015  CU
  16  ZN       *      0.026+- 0.004   0.073+- 0.013     0.014+- 0.012  0.560+-0.540  ZN
  17  AS              0.011+- 0.006   0.031+- 0.018     0.000+- 0.000  0.000+-0.030  AS
  18  BR       *      0.075+- 0.009   0.214+- 0.033     0.073+- 0.025  0.968+-0.454  BR
  19  SR              0.002+- 0.001   0.005+- 0.004     0.000+- 0.000  0.000+-0.203  SR
  20  CD              0.010+- 0.009   0.027+- 0.027     0.000+- 0.000  0.000+-0.034  CD
  21  PB       *      0.193+- 0.023   0.551+- 0.086     0.189+- 0.028  0.979+-0.203  PB
  22  OC       *     14.410+- 2.210  41.086+- 7.544    16.080+- 4.477  1.116+-0.466  OC
  23  EC       *      3.760+- 0.790  10.720+- 2.499     4.505+- 2.727  1.198+-1.132  EC
 -------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  35.1+- 3.5
```

```
CMBDEQ RESULTS FOR CMB # 010140
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 223   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 18
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.392 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG     UG/M3                  %
 ------------------------------------------------------------------------------------------
  1    RESW    *  26.007+- 7.397   73.021+-22.037
  4    TRAN    *   1.597+- 0.268    4.483+- 0.878
  5    RDOI    *   0.250+- 0.052    0.701+- 0.163
  7    RDUS    *   0.475+- 0.073    1.334+- 0.245
 11    MARI    *   0.403+- 0.091    1.130+- 0.281
 14    ALUM    *   0.231+- 0.107    0.650+- 0.308
 18    SECS    *   1.375+- 0.382    3.861+- 1.140
 ------------------------------------------------------------------------------------------
      TOTAL:      30.337+- 7.413   85.179+-22.520

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG       MEAS. UG/M3          PERCENT          CALC. UG/M3          RATIO
 ------------------------------------------------------------------------------------------
   1  NA      *      0.209+- 0.030    0.586+- 0.103     0.207+- 0.021  0.991+-0.141   NA
   2  MG             0.012+- 0.012    0.034+- 0.033     0.065+- 0.024  5.346+-$10.9   MG
   3  AL      *      0.113+- 0.016    0.318+- 0.054     0.113+- 0.023  1.001+-0.290   AL
   4  SI      *      0.122+- 0.015    0.341+- 0.054     0.119+- 0.006  0.975+-0.074   SI
   5  P              0.045+- 0.006    0.125+- 0.021     0.000+- 0.000  0.000+-0.006   P
   6  S       *      0.615+- 0.077    1.727+- 0.278     0.615+- 0.098  1.000+-0.225   S
   7  CL      *      0.307+- 0.039    0.862+- 0.141     0.334+- 0.139  1.088+-0.668   CL
   8  K       *      0.210+- 0.025    0.590+- 0.093     0.235+- 0.182  1.120+-1.301   K
   9  CA             0.020+- 0.004    0.056+- 0.013     0.058+- 0.029  2.902+-4.508   CA
  10  TI      *      0.005+- 0.002    0.015+- 0.005     0.009+- 0.006  1.577+-2.055   TI
  11  V       *      0.008+- 0.002    0.022+- 0.005     0.009+- 0.002  1.149+-0.375   V
  12  MN             0.006+- 0.001    0.016+- 0.004     0.001+- 0.000  0.129+-0.050   MN
  13  FE      *      0.041+- 0.006    0.115+- 0.021     0.066+- 0.029  1.622+-1.337   FE
  14  NI      *      0.016+- 0.003    0.045+- 0.009     0.014+- 0.003  0.859+-0.249   NI
  15  CU             0.037+- 0.005    0.103+- 0.017     0.000+- 0.000  0.012+-0.007   CU
  16  ZN             0.026+- 0.004    0.073+- 0.012     0.013+- 0.010  0.487+-0.418   ZN
  17  AS                   <  0.133          <  0.373   0.000+- 0.000  0.000+-0.000   AS
  18  BR      *      0.086+- 0.010    0.241+- 0.037     0.086+- 0.029  1.002+-0.477   BR
  19  SR                   <  0.029          <  0.083   0.000+- 0.000  0.000+-0.000   SR
  20  CD                   <  0.173          <  0.487   0.000+- 0.000  0.000+-0.000   CD
  21  PB      *      0.233+- 0.027    0.653+- 0.101     0.222+- 0.033  0.956+-0.197   PB
  22  OC      *     11.770+- 2.180   33.047+- 6.971    13.146+- 3.592  1.117+-0.457   OC
  23  EC      *      6.230+- 1.290   17.492+- 4.030     3.746+- 2.190  0.601+-0.410   EC
 ------------------------------------------------------------------------------------------
MEAS  AMB MASS (UG/M3):  FINE:  35.6+- 3.6
```

```
CMBDEQ RESULTS FOR CMB # 010144
 FINE PARTICULATE FRACTION
 SAMPLING DATE: 81 226   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 18
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.169 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                 %
 ---------------------------------------------------------------------------------
  1    RESWD   *  28.961+- 7.245   81.704+-22.039
  4    TRANS   *   1.363+- 0.229    3.846+- 0.753
  7    RDUST   *   0.207+- 0.039    0.585+- 0.125
 14    ALUMP   *   0.136+- 0.065    0.384+- 0.188
 18    SECSO   *   0.831+- 0.318    2.346+- 0.927
 19    GALVN   *   0.023+- 0.015    0.064+- 0.042
 ---------------------------------------------------------------------------------
       TOTAL:     31.521+- 7.256   88.928+-22.350

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3         PERCENT          CALC. UG/M3         RATIO
 ---------------------------------------------------------------------------------
   1  NA      *      0.037+- 0.006   0.105+- 0.019     0.032+- 0.014  0.866+-0.481  NA
   2  MG             0.017+- 0.007   0.047+- 0.022     0.039+- 0.024  2.372+-3.653  MG
   3  AL      *      0.062+- 0.010   0.175+- 0.034     0.063+- 0.014  1.015+-0.314  AL
   4  SI      *      0.055+- 0.008   0.156+- 0.027     0.055+- 0.004  0.990+-0.097  SI
   5  P              0.045+- 0.006   0.128+- 0.021     0.000+- 0.000  0.000+-0.006  P
   6  S       *      0.383+- 0.051   1.081+- 0.182     0.383+- 0.090  1.000+-0.332  S
   7  CL      *      0.207+- 0.028   0.583+- 0.098     0.181+- 0.148  0.876+-0.950  CL
   8  K       *      0.178+- 0.022   0.503+- 0.080     0.251+- 0.203  1.411+-1.966  K
   9  CA             0.013+- 0.003   0.037+- 0.010     0.041+- 0.027  3.119+-6.843  CA
  10  TI      *      0.002+- 0.001   0.005+- 0.003     0.006+- 0.005  3.023+-8.475  TI
  11  V              0.001+- 0.001   0.003+- 0.002     0.000+- 0.000  0.112+-0.247  V
  12  MN             0.003+- 0.001   0.008+- 0.003     0.000+- 0.000  0.100+-0.109  MN
  13  FE      *      0.030+- 0.005   0.084+- 0.016     0.038+- 0.024  1.288+-1.342  FE
  14  NI                   < 0.019           < 0.052   0.000+- 0.000  0.000+-0.000  NI
  15  CU             0.019+- 0.003   0.054+- 0.010     0.000+- 0.000  0.006+-0.015  CU
  16  ZN      *      0.030+- 0.004   0.086+- 0.014     0.030+- 0.011  1.000+-0.504  ZN
  17  AS             0.006+- 0.006   0.017+- 0.017     0.000+- 0.000  0.000+-0.047  AS
  18  BR      *      0.069+- 0.008   0.196+- 0.030     0.073+- 0.025  1.048+-0.516  BR
  19  SR                   < 0.027           < 0.076   0.000+- 0.000  0.000+-0.000  SR
  20  CD                   < 0.197           < 0.556   0.000+- 0.000  0.000+-0.000  CD
  21  PB      *      0.198+- 0.023   0.559+- 0.087     0.189+- 0.028  0.954+-0.197  PB
  22  OC      *     14.830+- 2.240  41.838+- 7.599    14.381+- 3.998  0.970+-0.376  OC
  23  EC      *      3.110+- 0.660   8.774+- 2.062     4.063+- 2.436  1.306+-1.289  EC
 ---------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  35.4+- 3.6
```

```
CMBDEQ RESULTS FOR CMB # 010130
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 305   SITE: SITE 5   SITE CODE: 0000005
SAMPLING DURATION: 23 HRS. WITH START HOUR: 18
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.426 DEGREES OF FREEDOM:  8
 CODE SOURCE FLG      UG/M3                 %
 ----------------------------------------------------------------------------------
  1    RESWD   *  49.009+-13.688   70.433+-21.002
  4    TRANS   *   3.079+- 0.520    4.425+- 0.879
  5    RDOIL   *   0.185+- 0.123    0.266+- 0.178
  7    RDUST   *   1.520+- 0.191    2.185+- 0.357
 11    MARIN   *   0.439+- 0.118    0.630+- 0.182
 18    SECSO   *   2.170+- 0.684    3.119+- 1.036
 19    GALVN   *   0.029+- 0.025    0.042+- 0.036
 ----------------------------------------------------------------------------------
       TOTAL:     56.431+-13.718   81.101+-21.456

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------
   1  NA       *     0.241+- 0.035   0.347+- 0.062    0.242+- 0.029  1.001+-0.171  NA
   2  MG             0.047+- 0.025   0.068+- 0.037    0.103+- 0.043  2.174+-2.179  MG
   3  AL       *     0.198+- 0.028   0.284+- 0.050    0.150+- 0.043  0.759+-0.270  AL
   4  SI       *     0.358+- 0.042   0.514+- 0.081    0.359+- 0.018  1.004+-0.072  SI
   5  P              0.090+- 0.012   0.129+- 0.022    0.000+- 0.000  0.000+-0.005  P
   6  S        *     0.971+- 0.125   1.395+- 0.231    0.971+- 0.185  1.000+-0.270  S
   7  CL       *     0.503+- 0.106   0.723+- 0.170    0.497+- 0.254  0.988+-0.711  CL
   8  K        *     0.315+- 0.039   0.452+- 0.073    0.444+- 0.343  1.410+-1.885  K
   9  CA             0.065+- 0.010   0.093+- 0.017    0.115+- 0.056  1.770+-1.764  CA
  10  TI       *     0.008+- 0.003   0.011+- 0.004    0.020+- 0.012  2.537+-4.037  TI
  11  V        *     0.009+- 0.006   0.013+- 0.009    0.007+- 0.001  0.764+-0.211  V
  12  MN             0.006+- 0.002   0.009+- 0.003    0.002+- 0.001  0.315+-0.094  MN
  13  FE       *     0.101+- 0.014   0.145+- 0.026    0.154+- 0.056  1.523+-1.009  FE
  14  NI       *     0.008+- 0.008   0.012+- 0.012    0.010+- 0.002  1.182+-0.423  NI
  15  CU             0.030+- 0.005   0.044+- 0.008    0.001+- 0.001  0.020+-0.017  CU
  16  ZN       *     0.047+- 0.006   0.067+- 0.012    0.047+- 0.018  1.000+-0.558  ZN
  17  AS                   <  0.109         <  0.157    0.000+- 0.000  0.000+-0.096  AS
  18  BR       *     0.178+- 0.021   0.256+- 0.040    0.165+- 0.056  0.928+-0.428  BR
  19  SR                   <  0.028         <  0.041    0.000+- 0.000  0.000+-0.000  SR
  20  CD                   <  0.180         <  0.259    0.000+- 0.000  0.000+-0.000  CD
  21  PB       *     0.449+- 0.053   0.645+- 0.102    0.431+- 0.064  0.959+-0.197  PB
  22  OC       *    27.290+- 4.140  39.220+- 7.223   24.833+- 6.769  0.910+-0.335  OC
  23  EC       *     5.190+- 1.080   7.459+- 1.737    7.077+- 4.127  1.364+-1.345  EC
 ----------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  69.6+- 7.3
```

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CMBDEQ RESULTS FOR CMB # 010092
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 206   SITE: SITE 6   SITE CODE: 0000006
SAMPLING DURATION: 24 HRS  WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.352 DEGREES OF FREEDOM:    5
 CODE SOURCE FLG     UG/M3              %
 ------------------------------------------------------------------------------------
  1   RESWD   *  14.763+- 4.208   66.359+-20.092
  4   TRANS   *   0.565+- 0.099    2.542+- 0.517
  5   RDOIL   *   0.112+- 0.027    0.502+- 0.132
  6   CDUST   *   0.354+- 0.065    1.591+- 0.336
 11   MARIN   *   0.197+- 0.048    0.884+- 0.235
 14   ALUMP   *   0.163+- 0.080    0.734+- 0.367
 18   SECSO   *   3.224+- 0.456   14.489+- 2.529
 19   GALVN   *   0.019+- 0.008    0.084+- 0.038
 ------------------------------------------------------------------------------------
      TOTAL:     19.397+- 4.236   87.186+-21.017

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA      *     0.104+- 0.015   0.467+- 0.083    0.104+- 0.011  1.000+-0.15050  NA
   2  MG                  < 0.167           < 0.751    0.036+- 0.013  0.000+-0.00000  MG
   3  AL      *     0.090+- 0.013   0.407+- 0.071    0.090+- 0.016  0.994+-0.24242  AL
   4  SI      *     0.100+- 0.012   0.449+- 0.072    0.095+- 0.012  0.950+-0.16767  SI
   5  P             0.054+- 0.007   0.242+- 0.040    0.000+- 0.000  0.000+-0.00303  P
   6  S       *     1.137+- 0.134   5.109+- 0.796    1.137+- 0.068  1.000+-0.08585  S
   7  CL            0.046+- 0.011   0.207+- 0.055    0.169+- 0.078  3.680+-6.45151  CL
   8  K       *     0.165+- 0.020   0.743+- 0.119    0.134+- 0.103  0.811+-0.80505  K
   9  CA            0.007+- 0.002   0.031+- 0.012    0.025+- 0.013  3.603+-6.80404  CA
  10  TI            0.001+- 0.001   0.006+- 0.004    0.005+- 0.002  3.348+-5.65151  TI
  11  V       *     0.004+- 0.001   0.020+- 0.005    0.004+- 0.001  0.918+-0.26363  V
  12  MN            0.003+- 0.001   0.013+- 0.004    0.001+- 0.000  0.278+-0.13131  MN
  13  FE      *     0.027+- 0.004   0.120+- 0.023    0.039+- 0.013  1.445+-0.85757  FE
  14  NI      *     0.006+- 0.001   0.027+- 0.007    0.006+- 0.001  1.068+-0.33939  NI
  15  CU            0.028+- 0.004   0.124+- 0.021    0.000+- 0.000  0.008+-0.00606  CU
  16  ZN      *     0.022+- 0.003   0.097+- 0.017    0.022+- 0.006  1.000+-0.36363  ZN
  17  AS                  < 0.087           < 0.392    0.000+- 0.000  0.000+-0.00000  AS
  18  BR      *     0.027+- 0.004   0.123+- 0.020    0.031+- 0.010  1.115+-0.56060  BR
  19  SR                  < 0.026           < 0.116    0.000+- 0.000  0.000+-0.00000  SR
  20  CD                  < 0.203           < 0.912    0.000+- 0.000  0.000+-0.00000  CD
  21  PB      *     0.083+- 0.011   0.373+- 0.061    0.078+- 0.012  0.942+-0.19494  PB
  22  OC      *     6.350+- 1.140  28.542+- 5.895    7.278+- 2.038  1.146+-0.48818  OC
  23  EC      *     2.920+- 0.620  13.125+- 3.092    2.055+- 1.241  0.704+-0.52020  EC
 ------------------------------------------------------------------------------------
MEAS. AMB  MASS (UG/M3):  FINE:  22.2+- 2.3
```

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CMBDEQ RESULTS FOR CMB # 010121
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 221   SITE: SITE 6   SITE CODE: 0000006
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.648 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG     UG/M3                 %
 ----------------------------------------------------------------------------------
  1    RESWD   *   4.977+- 1.485   68.268+-21.922
  4    TRANS   *   0.231+- 0.045    3.163+- 0.721
  6    CDUST   *   0.147+- 0.025    2.012+- 0.422
 11    MARIN   *   0.726+- 0.125    9.966+- 2.087
 18    SECSO   *   0.696+- 0.130    9.550+- 2.118
 19    GALVN   *   0.005+- 0.003    0.065+- 0.041
 ----------------------------------------------------------------------------------
       TOTAL       6.781+- 1.497   93.023+-23.314

 SPECIE      FIT           FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3        PERCENT        CALC. UG/M3       RATIO
 ----------------------------------------------------------------------------------
   1  NA       *     0.306+- 0.044   4.198+- 0.779    0.296+- 0.029  0.966+-0.132  NA
   2  MG             0.032+- 0.009   0.436+- 0.134    0.043+- 0.008  1.354+-0.409  MG
   3  AL       *     0.028+- 0.006   0.385+- 0.098    0.019+- 0.003  0.659+-0.145  AL
   4  SI       *     0.036+- 0.005   0.490+- 0.095    0.039+- 0.005  1.082+-0.207  SI
   5  P              0.017+- 0.003   0.237+- 0.051    0.000+- 0.000  0.000+-0.003  P
   6  S        *     0.272+- 0.037   3.730+- 0.674    0.272+- 0.021  1.000+-0.111  S
   7  CL             0.108+- 0.016   1.484+- 0.286    0.321+- 0.077  2.970+-2.229  CL
   8  K        *     0.052+- 0.008   0.716+- 0.136    0.054+- 0.035  1.043+-0.965  K
   9  CA       *     0.015+- 0.003   0.204+- 0.048    0.018+- 0.005  1.179+-0.509  CA
  10  TI             0.001+- 0.001   0.018+- 0.011    0.002+- 0.001  1.425+-1.238  TI
  11  V              0.001+- 0.001   0.004+- 0.008    0.000+- 0.000  0.061+-0.086  V
  12  MN             0.002+- 0.001   0.026+- 0.011    0.000+- 0.000  0.154+-0.075  MN
  13  FE       *     0.011+- 0.003   0.148+- 0.040    0.014+- 0.005  1.319+-0.817  FE
  14  NI                   <  0.015          <  0.203    0.000+- 0.000  0.000+-0.000  NI
  15  CU             0.017+- 0.003   0.230+- 0.045    0.000+- 0.000  0.002+-0.003  CU
  16  ZN       *     0.006+- 0.001   0.081+- 0.020    0.006+- 0.002  1.000+-0.447  ZN
  17  AS             0.003+- 0.003   0.047+- 0.042    0.000+- 0.000  0.000+-0.015  AS
  18  BR       *     0.011+- 0.002   0.155+- 0.031    0.014+- 0.004  1.214+-0.583  BR
  19  SR             0.001+- 0.001   0.021+- 0.017    0.000+- 0.000  0.000+-0.034  SR
  20  CD                   <  0.156          <  2.140    0.000+- 0.000  0.000+-0.000  CD
  21  PB       *     0.035+- 0.006   0.487+- 0.096    0.032+- 0.005  0.896+-0.131  PB
  22  OC       *     2.190+- 0.480  30.042+- 7.489    2.463+- 0.687  1.125+-0.472  OC
  23  EC       *     1.130+- 0.280  15.501+- 4.260    0.704+- 0.419  0.623+-0.437  EC
 ----------------------------------------------------------------------------------
MEAS. AMB  MASS (UG/M3):  FINE:   7.3+- 0.9
```

```
CMBDEQ RESULTS FOR CMB # 010143
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 305   SITE: SITE 6   SITE CODE: 0000006
SAMPLING DURATION: 23 HRS. WITH START HOUR: 17
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.563 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG      UG/M3               %
-------------------------------------------------------------------------------------
  1    RESWD    *   2.656+- 0.900   62.866+-23.275
  4    TRANS    *   0.136+- 0.031    3.220+- 0.876
  6    CDUST    *   0.161+- 0.026    3.799+- 0.843
 11    MARIN    *   0.328+- 0.057    7.764+- 1.783
 18    SECSO    *   0.297+- 0.071    7.021+- 1.975
-------------------------------------------------------------------------------------
      TOTAL:        3.578+- 0.905   84.669+-24.883

 SPECIE       FIT             FINE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS. UG/M3         PERCENT          CALC. UG/M3        RATIO
-------------------------------------------------------------------------------------
   1  NA       *      0.135+- 0.019    3.188+- 0.660     0.135+- 0.013   0.999+-0.138  NA
   2  MG              0.010+- 0.006    0.244+- 0.140     0.022+- 0.004   2.105+-0.861  MG
   3  AL       *      0.026+- 0.006    0.625+- 0.166     0.020+- 0.004   0.740+-0.168  AL
   4  SI       *      0.040+- 0.006    0.951+- 0.201     0.042+- 0.005   1.034+-0.196  SI
   5  P               0.010+- 0.003    0.237+- 0.071     0.000+- 0.000   0.000+-0.003  P
   6  S        *      0.119+- 0.020    2.816+- 0.642     0.119+- 0.011   1.000+-0.129  S
   7  CL              0.055+- 0.011    1.299+- 0.317     0.148+- 0.035   2.695+-1.859  CL
   8  K        *      0.018+- 0.004    0.438+- 0.109     0.029+- 0.019   1.570+-1.873  K
   9  CA       *      0.010+- 0.002    0.237+- 0.065     0.009+- 0.003   0.946+-0.384  CA
  10  TI                    <  0.020          <  0.471   0.002+- 0.001   0.000+-0.000  TI
  11  V                     <  0.012          <  0.275   0.000+- 0.000   0.000+-0.000  V
  12  MN              0.003+- 0.001    0.062+- 0.023     0.000+- 0.000   0.123+-0.057  MN
  13  FE       *      0.009+- 0.003    0.204+- 0.071     0.013+- 0.004   1.562+-0.954  FE
  14  NI                    <  0.019          <  0.440   0.000+- 0.000   0.000+-0.000  NI
  15  CU              0.007+- 0.001    0.166+- 0.043     0.000+- 0.000   0.005+-0.004  CU
  16  ZN              0.003+- 0.001    0.071+- 0.024     0.001+- 0.001   0.390+-0.355  ZN
  17  AS                    <  0.056          <  1.323   0.000+- 0.000   0.000+-0.000  AS
  18  BR       *      0.007+- 0.001    0.161+- 0.041     0.008+- 0.002   1.161+-0.556  BR
  19  SR                    <  0.026          <  0.622   0.000+- 0.000   0.000+-0.000  SR
  20  CD                    <  0.178          <  4.208   0.000+- 0.000   0.000+-0.000  CD
  21  PB       *      0.021+- 0.004    0.490+- 0.129     0.019+- 0.003   0.908+-0.184  PB
  22  OC       *      1.220+- 0.370   28.873+- 9.762     1.320+- 0.367   1.082+-0.443  OC
  23  EC       *      0.660+- 0.210   15.620+- 5.491     0.383+- 0.224   0.581+-0.392  EC
-------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:    4.2+- 0.6
```

```
CMBDEQ RESULTS FOR CMB # 010003
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801217   SITE: SITE 7   SITE CODE: 0000007
SAMPLING DURATION: 24 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.019 DEGREES OF FREEDOM: 12
 CODE SOURCE FLG      UG/M3              %
 ------------------------------------------------------------------------------------
  1   RESWD   *  53.104+-18.808   13.574+- 4.996
  3   UDUST   *   1.560+- 0.264    0.399+- 0.078
  4   TRANS   *   5.713+- 0.969    1.460+- 0.287
  5   RDOIL   *   0.240+- 0.094    0.061+- 0.025
 12   HOGFU   *  65.315+-11.300   16.695+- 3.337
 ------------------------------------------------------------------------------------
      TOTAL:    125.933+-21.965   32.190+- 6.473

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS  UG/M3         PERCENT          CALC. UG/M3         RATIO
 ------------------------------------------------------------------------------------
   1  NA       *    11.057+- 1.638    2.826+- 0.505     9.228+- 1.960  0.835+-0.231  NA
   2  MG             0.270+- 0.050    0.069+- 0.014     0.119+- 0.058  0.441+-0.235  MG
   3  AL       *     0.134+- 0.050    0.034+- 0.013     0.232+- 0.048  1.729+-0.712  AL
   4  SI       *     0.439+- 0.061    0.112+- 0.019     0.407+- 0.024  0.928+-0.074  SI
   5  P              0.230+- 0.036    0.059+- 0.011     0.000+- 0.001  0.000+-0.004  P
   6  S        *     3.147+- 0.379    0.805+- 0.126     2.318+- 1.341  0.737+-0.529  S
   7  CL       *     4.971+- 0.571    1.271+- 0.194     8.896+- 7.843  1.790+-3.234  CL
   8  K        *     4.437+- 0.503    1.134+- 0.171     6.350+- 3.936  1.431+-1.549  K
   9  CA       *     0.373+- 0.051    0.095+- 0.016     2.105+- 1.310  5.647+-$20.1  CA
  10  TI       *     0.023+- 0.007    0.006+- 0.002     0.029+- 0.021  1.258+-1.496  TI
  11  V        *     0.016+- 0.005    0.004+- 0.001     0.009+- 0.002  0.542+-0.143  V
  12  MN       *     0.077+- 0.011    0.020+- 0.003     0.132+- 0.065  1.722+-1.692  MN
  13  FE       *     0.380+- 0.047    0.097+- 0.016     0.385+- 0.122  1.014+-0.456  FE
  14  NI       *     0.007+- 0.005    0.002+- 0.001     0.013+- 0.003  1.922+-0.979  NI
  15  CU             0.055+- 0.010    0.014+- 0.003     0.018+- 0.004  0.336+-0.077  CU
  16  ZN       *     0.315+- 0.037    0.081+- 0.013     0.222+- 0.068  0.706+-0.266  ZN
  17  AS       *          <  0.384         <  0.098     0.000+- 0.001  0.000+-0.000  AS
  18  BR       *     0.288+- 0.034    0.074+- 0.011     0.315+- 0.103  1.093+-0.532  BR
  19  SR                  <  0.174         <  0.044     0.000+- 0.001  0.000+-0.000  SR
  20  CD                  <  0.977         <  0.250     0.000+- 0.001  0.000+-0.000  CD
  21  PB       *     0.828+- 0.099    0.212+- 0.033     0.810+- 0.119  0.978+-0.201  PB
  22  OC       *    26.210+- 5.480    6.700+- 1.553    31.134+- 7.796  1.188+-0.462  OC
  23  EC       *    19.630+- 4.050    5.018+- 1.151    11.120+- 5.199  0.566+-0.304  EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE: 391.2+-39.1
```

```
CMBDEQ RESSULTS FOR CMB # 010005
 FINE  PARRTICULATE FRACTION
 SAMPLING  DATE: 81 116   SITE: SITE 7   SITE CODE: 0000007
SAMPLING DDURATION: 24 HRS. WITH START HOUR: 99
BACKGROUNDD SITE SUBTRACTED: NO
 EFFECTIVEE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.023 DEGREES OF FREEDOM: 10
 CODE SOURRCE FLG      UG/M3                  %
 ----------------------------------------------------------------------------------
  1    RESWWD   *  62.243+-19.005   35.570+-11.430
  3    UDUSST       1.976+- 0.265    1.129+- 0.189
  4    TRANNS   *   3.636+- 0.618    2.078+- 0.410
  5    RDOIIL   *   0.245+- 0.080    0.140+- 0.048
 12    HOGFFU       9.618+- 2.330    5.496+- 1.441
 18    SECSSO       2.848+- 1.092    1.628+- 0.645
 ----------------------------------------------------------------------------------
       TOTAAL:     80.567+-19.190   46.041+-11.896

 SPECIE       FIT             FINE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------
   1  NA        *       1.401+- 0.336    0.801+- 0.208     1.446+- 0.290  1.032+-0.298  NA
   2  MG                0.125+- 0.032    0.071+- 0.020     0.116+- 0.054  0.929+-0.585  MG
   3  AL                0.140+- 0.039    0.080+- 0.024     0.192+- 0.016  1.368+-0.194  AL
   4  SI                0.553+- 0.069    0.316+- 0.051     0.494+- 0.027  0.894+-0.065  SI
   5  P                 0.085+- 0.021    0.048+- 0.013     0.000+- 0.001  0.000+-0.007  P
   6  S                 1.525+- 0.192    0.871+- 0.140     1.525+- 0.295  1.000+-0.274  S
   7  CL        *       1.495+- 0.181    0.854+- 0.134     1.653+- 1.197  1.106+-1.194  CL
   8  K         *       1.539+- 0.177    0.879+- 0.134     1.420+- 0.723  0.923+-0.639  K
   9  CA                0.302+- 0.040    0.173+- 0.029     0.426+- 0.205  1.410+-1.173  CA
  10  TI                      < 0.101          < 0.058     0.025+- 0.014  0.000+-0.000  TI
  11  V         *       0.015+- 0.004    0.009+- 0.002     0.009+- 0.002  0.584+-0.148  V
  12  MN                0.025+- 0.005    0.014+- 0.003     0.022+- 0.010  0.868+-0.515  MN
  13  FE        *       0.172+- 0.023    0.098+- 0.016     0.200+- 0.066  1.167+-0.594  FE
  14  NI        *       0.007+- 0.004    0.004+- 0.003     0.013+- 0.003  1.773+-0.833  NI
  15  CU                0.031+- 0.007    0.017+- 0.004     0.004+- 0.001  0.117+-0.034  CU
  16  ZN                0.084+- 0.011    0.048+- 0.008     0.057+- 0.025  0.678+-0.361  ZN
  17  AS                      < 0.374          < 0.214     0.000+- 0.001  0.000+-0.000  AS
  18  BR                0.188+- 0.022    0.107+- 0.017     0.195+- 0.066  1.038+-0.505  BR
  19  SR                      < 0.182          < 0.104     0.000+- 0.001  0.000+-0.000  SR
  20  CD                      < 1.060          < 0.606     0.000+- 0.001  0.000+-0.000  CD
  21  PB        *       0.517+- 0.063    0.296+- 0.047     0.508+- 0.075  0.981+-0.204  PB
  22  OC        *      23.520+- 5.480   13.441+- 3.409    31.837+- 8.604  1.354+-0.616  OC
  23  EC        *      20.590+- 4.250   11.766+- 2.699     9.358+- 5.254  0.455--0.280  EC
 ----------------------------------------------------------------------------------
MEAS. AMB.. MASS (UG/M3):  FINE: 175.0+-17.5
```

```
CMBDEQ RESULTS FOR CMB # 010001
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 115   SITE: SITE 8   SITE CODE: 0000008
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.317 DEGREES OF FREEDOM:  5
 CODE SOURCE FLG     UG/M3                %
 ------------------------------------------------------------------------------------------
  1   RESWD   *  65.987+-19.671   58.599+-20.561
  4   TRANS   *  14.502+- 2.712   12.878+- 3.388
  5   RDOIL   *   0.878+- 0.259    0.780+- 0.272
 11   MARIN   *   2.497+- 0.521    2.217+- 0.619
 ------------------------------------------------------------------------------------------
      TOTAL:     83.864+-19.866   74.474+-22.386

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------------
   1  NA       *      1.246+- 0.203   1.107+- 0.273    1.084+- 0.105  0.870+-0.112  NA
   2  MG              1.804+- 0.549   1.602+- 0.571    0.293+- 0.123  0.162+-0.069  MG
   3  AL                  <   0.321       <   0.285    0.039+- 0.023  0.000+-0.000  AL
   4  SI                  <   0.100       <   0.089    0.094+- 0.032  1.277+-0.709  SI
   5  P               0.149+- 0.073   0.133+- 0.069    0.000+- 0.001  0.000+-0.005  P
   6  S               4.229+- 0.585   3.756+- 0.868    0.888+- 0.731  0.210+-0.177  S
   7  CL       *      1.006+- 0.174   0.893+- 0.226    1.675+- 0.434  1.666+-0.837  CL
   8  K        *      0.693+- 0.100   0.615+- 0.144    0.605+- 0.462  0.873+-0.885  K
   9  CA              0.109+- 0.028   0.097+- 0.030    0.263+- 0.228  2.415+-5.485  CA
  10  TI              0.028+- 0.013   0.025+- 0.013    0.047+- 0.054  1.710+-3.838  TI
  11  V        *      0.023+- 0.011   0.021+- 0.010    0.030+- 0.007  1.302+-0.468  V
  12  MN              0.054+- 0.014   0.048+- 0.015    0.000+- 0.001  0.007+-0.013  MN
  13  FE       *      0.735+- 0.101   0.653+- 0.150    0.294+- 0.260  0.400+-0.381  FE
  14  NI       *      0.056+- 0.017   0.050+- 0.018    0.047+- 0.011  0.836+-0.246  NI
  15  CU              0.089+- 0.020   0.079+- 0.023    0.001+- 0.001  0.007+-0.008  CU
  16  ZN              0.230+- 0.035   0.205+- 0.049    0.041+- 0.028  0.178+-0.122  ZN
  17  AS                  <   0.073       <   0.065    0.000+- 0.001  0.000+-0.000  AS
  18  BR             15.941+- 1.788  14.156+- 3.063    0.777+- 0.262  0.049+-0.016  BR
  19  SR                  <   0.022       <   0.019    0.000+- 0.001  0.000+-0.000  SR
  20  CD              0.189+- 0.121   0.168+- 0.112    0.000+- 0.001  0.000+-0.004  CD
  21  PB       *      1.977+- 0.239   1.755+- 0.388    2.002+- 0.300  1.013+-0.216  PB
  22  OC       *     44.650+- 6.460  39.651+- 9.314   37.686+- 9.192  0.844+-0.269  OC
  23  EC       *      7.740+- 1.600   6.873+- 1.907   12.234+- 5.717  1.581+-1.382  EC
 ------------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE: 112.6+-20.8
```

```
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CMBDEQ RESULTS FOR CMB # 010003
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 116   SITE: SITE 8   SITE CODE: 0000008
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.053 DEGREES OF FREEDOM:  5
 CODE SOURCE FLG     UG/M3                %
 ----------------------------------------------------------------------------------
  1    RESWD   *  68.242+-19.962    74.816+-26.910
  4    TRANS   *  12.846+- 2.411    14.084+- 3.959
  5    RDOIL   *   1.123+- 0.304     1.231+- 0.421
  8    RDUST   *   0.437+- 0.364     0.479+- 0.412
 11    MARIN   *   0.963+- 0.258     1.056+- 0.359
 18    SECSO   *   6.820+- 2.454     7.477+- 3.112
 19    GALVN   *   0.164+- 0.051     0.180+- 0.067
 ----------------------------------------------------------------------------------
      TOTAL:      90.595+-20.263    99.322+-30.426

                          FINE  SUSPENDED PARTICULATE
 SPECIE      FIT                          PERCENT          CALC. UG/M3        RATIO
 CODE        FLG      MEAS. UG/M3
 ----------------------------------------------------------------------------------
   1  NA      *      0.513+- 0.089   0.562+- 0.153     0.481+- 0.053  0.939+-0.142  NA
   2  MG                  <  0.300        <  0.329     0.212+- 0.113  0.000+-0.000  MG
   3  AL                  <  0.328        <  0.360     0.087+- 0.022  0.000+-0.000  AL
   4  SI      *      0.198+- 0.094   0.217+- 0.112     0.206+- 0.030  1.042+-0.218  SI
   5  P              0.148+- 0.072   0.162+- 0.086     0.001+- 0.001  0.010+-0.005  P
   6  S       *      3.061+- 0.456   3.356+- 0.862     3.061+- 0.661  1.000+-0.306  S
   7  CL      *      0.610+- 0.129   0.668+- 0.199     1.035+- 0.374  1.697+-1.209  CL
   8  K       *      0.570+- 0.085   0.625+- 0.161     0.607+- 0.478  1.064+-1.223  K
   9  CA             0.081+- 0.024   0.089+- 0.032     0.231+- 0.203  2.852+-7.590  CA
  10  TI             0.021+- 0.012   0.023+- 0.014     0.044+- 0.048  2.078+-5.147  TI
  11  V       *      0.024+- 0.012   0.027+- 0.014     0.039+- 0.008  1.597+-0.655  V
  12  MN             0.056+- 0.014   0.062+- 0.020     0.001+- 0.001  0.020+-0.013  MN
  13  FE      *      0.630+- 0.089   0.691+- 0.174     0.293+- 0.230  0.465+-0.403  FE
  14  NI      *      0.082+- 0.019   0.090+- 0.028     0.060+- 0.014  0.730+-0.204  NI
  15  CU             0.040+- 0.014   0.044+- 0.019     0.001+- 0.001  0.022+-0.019  CU
  16  ZN    . *      0.173+- 0.028   0.190+- 0.050     0.173+- 0.029  1.000+-0.234  ZN
  17  AS                  <  0.071        <  0.078     0.000+- 0.001  0.000+-0.000  AS
  18  BR            15.638+- 1.754  17.144+- 4.071     0.686+- 0.233  0.044+-0.015  BR
  19  SR                  <  0.022        <  0.024     0.000+- 0.001  0.000+-0.000  SR
  20  CD                  <  0.124        <  0.138     0.000+- 0.001  0.002+-0.007  CD
  21  PB      *      1.754+- 0.213   1.923+- 0.465     1.775+- 0.266  1.012+-0.216  PB
  22  OC      *     43.100+- 6.400  47.252+-12.127    38.068+- 9.483  0.883+-0.294  OC
  23  EC      *     10.660+- 2.200  11.687+- 3.435    12.090+- 5.865  1.134+-0.832  EC
 ----------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  91.2+-19.1
```

```
CMBDEQ RESULTS FOR CMB # 010012
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 31 104   SITE: SITE 9   SITE CODE: 0000009
SAMPLING DURATION: 22 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.226 DEGREES OF FREEDOM:  4
 CODE SOURCE FLG      UG/M3                %
 ----------------------------------------------------------------------------------------------
  1    RESWD    *  44.375+-32.257   87.019+-63.874
  4    TRANS    *   2.136+- 0.361    4.189+- 0.826
  5    RDOIL    *   0.722+- 0.141    1.415+- 0.311
  8    RDUST    *   0.488+- 0.088    0.956+- 0.198
 11    MARIN    *   1.054+- 0.287    2.067+- 0.601
 14    ALUMP    *   2.557+- 0.826    5.014+- 1.698
 18    SECSO    *   5.189+- 0.894   10.175+- 2.037
 19    GALVN    *   0.046+- 0.027    0.090+- 0.054
 ----------------------------------------------------------------------------------------------
       TOTAL:      56.566+-32.284  110.925+-64.309

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3         RATIO
 ----------------------------------------------------------------------------------------------
   1  NA       *      0.601+- 0.086    1.179+- 0.208     0.589+- 0.065   0.979+-0.151   NA
   2  MG              0.106+- 0.038    0.208+- 0.078     0.179+- 0.063   1.692+-1.170   MG
   3  AL       *      0.768+- 0.088    1.507+- 0.231     0.761+- 0.205   0.990+-0.375   AL
   4  SI       *      0.163+- 0.019    0.319+- 0.050     0.161+- 0.014   0.992+-0.118   SI
   5  P               0.111+- 0.013    0.217+- 0.034     0.002+- 0.000   0.015+-0.006   P
   6  S        *      2.045+- 0.237    4.011+- 0.619     2.045+- 0.165   1.000+-0.114   S
   7  CL       *      0.659+- 0.079    1.293+- 0.203     0.732+- 0.251   1.110+-0.568   CL
   8  K        *      0.458+- 0.053    0.899+- 0.139     0.408+- 0.311   0.889+-0.907   K
   9  CA              0.045+- 0.007    0.088+- 0.016     0.094+- 0.043   2.074+-2.185   CA
  10  TI              0.002+- 0.001    0.004+- 0.002     0.011+- 0.008   5.683+-$24.1   TI
  11  V        *      0.029+- 0.004    0.057+- 0.010     0.027+- 0.006   0.922+-0.259   V
  12  MN              0.002+- 0.001    0.004+- 0.002     0.001+- 0.001   0.628+-0.284   MN
  13  FE       *      0.075+- 0.010    0.146+- 0.024     0.097+- 0.039   1.297+-0.861   FE
  14  NI       *      0.041+- 0.006    0.080+- 0.014     0.044+- 0.009   1.070+-0.324   NI
  15  CU              0.016+- 0.003    0.032+- 0.006     0.002+- 0.001   0.105+-0.032   CU
  16  ZN       *      0.059+- 0.007    0.115+- 0.018     0.059+- 0.017   1.000+-0.403   ZN
  17  AS              0.089+- 0.013    0.175+- 0.031     0.000+- 0.000   0.000+-0.005   AS
  18  BR       *      0.100+- 0.012    0.195+- 0.030     0.117+- 0.039   1.173+-0.599   BR
  19  SR              0.003+- 0.001    0.005+- 0.003     0.000+- 0.000   0.039+-0.173   SR
  20  CD                    <  0.204            <  0.400     0.000+- 0.001   0.000+-0.000   CD
  21  PB       *      0.316+- 0.037    0.620+- 0.096     0.296+- 0.044   0.938+-0.192   PB
  22  OC             -1.000+--1.000   -1.000+--1.000    22.231+- 6.128   0.938+-0.000   OC
  23  EC             -1.000+--1.000   -1.000+--1.000     6.238+- 3.733   0.938+-0.000   EC
 ----------------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:   51.0+- 5.2
```

```
CMBDEQ RESULTS FOR CMB # 010013
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 116   SITE: SITE 9   SITE CODE: 0000009
SAMPLING DURATION: 23 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   3.266 DEGREES OF FREEDOM:  4
 CODE SOURCE FLG      UG/M3                  %
 --------------------------------------------------------------------------------
  1   RESWD    *  43.689+-32.831  112.077+-85.005
  4   TRANS    *   2.839+- 0.464    7.283+- 1.407
  5   RDOIL    *   0.574+- 0.107    1.472+- 0.314
  8   RDUST    *   0.548+- 0.086    1.405+- 0.264
 11   MARIN    *   1.673+- 0.328    4.292+- 0.950
 14   ALUMP    *   0.377+- 0.152    0.966+- 0.402
 18   SECSO    *   3.993+- 0.820   10.244+- 2.353
 19   GALVN    *   0.041+- 0.027    0.104+- 0.070
 --------------------------------------------------------------------------------
      TOTAL:      53.733+-32.846  137.843+-85.443

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG       MEAS. UG/M3          PERCENT         CALC. UG/M3        RATIO
 --------------------------------------------------------------------------------
   1  NA       *      0.781+- 0.112    2.004+- 0.353     0.741+- 0.071  0.948+-0.125  NA
   2  MG                    < 0.659           < 1.690     0.154+- 0.045  0.000+-0.000  MG
   3  AL       *      0.177+- 0.023    0.455+- 0.074     0.179+- 0.032  1.008+-0.255  AL
   4  SI       *      0.168+- 0.020    0.431+- 0.068     0.173+- 0.012  1.031+-0.102  SI
   5  P               0.095+- 0.011    0.243+- 0.038     0.002+- 0.000  0.019+-0.005  P
   6  S        *      1.647+- 0.192    4.226+- 0.657     1.647+- 0.181  1.000+-0.155  S
   7  CL       *      0.759+- 0.090    1.947+- 0.305     0.963+- 0.279  1.269+-0.594  CL
   8  K        *      0.526+- 0.061    1.348+- 0.209     0.406+- 0.306  0.772+-0.735  K
   9  CA              0.037+- 0.006    0.094+- 0.018     0.101+- 0.051  2.751+-4.104  CA
  10  TI              0.007+- 0.002    0.019+- 0.005     0.012+- 0.011  1.637+-2.690  TI
  11  V        *      0.019+- 0.003    0.050+- 0.009     0.020+- 0.004  1.047+-0.325  V
  12  MN              0.025+- 0.003    0.064+- 0.010     0.001+- 0.000  0.044+-0.018  MN
  13  FE       *      0.316+- 0.037    0.811+- 0.126     0.099+- 0.051  0.312+-0.169  FE
  14  NI       *      0.031+- 0.004    0.079+- 0.014     0.031+- 0.007  1.019+-0.322  NI
  15  CU              0.020+- 0.003    0.052+- 0.009     0.001+- 0.000  0.032+-0.023  CU
  16  ZN       *      0.054+- 0.007    0.138+- 0.023     0.054+- 0.016  1.000+-0.432  ZN
  17  AS              0.023+- 0.008    0.058+- 0.023     0.000+- 0.000  0.000+-0.019  AS
  18  BR       *      0.129+- 0.015    0.330+- 0.051     0.155+- 0.051  1.202+-0.625  BR
  19  SR              0.003+- 0.001    0.008+- 0.004     0.000+- 0.000  0.035+-0.134  SR
  20  CD                    < 0.202           < 0.517     0.000+- 0.001  0.000+-0.000  CD
  21  PB       *      0.377+- 0.043    0.967+- 0.149     0.393+- 0.059  1.043+-0.225  PB
  22  OC             -1.000+--1.000   -1.000+--1.000    22.058+- 6.034  1.043+-0.000  OC
  23  EC             -1.000+--1.000   -1.000+--1.000     6.334+- 3.680  1.043+-0.000  EC
 --------------------------------------------------------------------------------
MEAS. AMB  MASS (UG/M3):  FINE:  39.0+- 4.0
```

```
CMBDER RESULTS FOR CMB # 010014
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 203   SITE: SITE 9   SITE CODE: 0000009
SAMPLING DURATION: 22 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   5.746 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG      UG/M3                %
 ---------------------------------------------------------------------------------
  1   RESWD   *  20.378+-14.615   45.284+-32.808
  4   TRANS   *   3.022+- 0.486    6.717+- 1.280
  5   RDOIL   *   0.197+- 0.045    0.437+- 0.109
  8   RDUST   *   1.663+- 0.213    3.696+- 0.607
 11   MARIN   *   0.473+- 0.110    1.051+- 0.267
 14   ALUMP   *   0.384+- 0.202    0.853+- 0.457
 18   SECSO   *   3.473+- 0.706    7.718+- 1.756
 19   GALVN   *   0.047+- 0.015    0.104+- 0.034
 ---------------------------------------------------------------------------------
      TOTAL:     29.637+-14.644   65.860+-33.233

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3         PERCENT        CALC. UG/M3        RATIO
 ---------------------------------------------------------------------------------
   1  NA      *      0.241+- 0.035   0.535+- 0.095    0.229+- 0.022  0.950+-0.128  NA
   2  MG             0.027+- 0.013   0.061+- 0.031    0.096+- 0.029  3.476+-3.779  MG
   3  AL      *      0.296+- 0.036   0.657+- 0.104    0.298+- 0.034  1.008+-0.161  AL
   4  SI      *      0.437+- 0.050   0.971+- 0.149    0.476+- 0.030  1.089+-0.103  SI
   5  P              0.099+- 0.012   0.221+- 0.035    0.006+- 0.001  0.056+-0.006  P
   6  S       *      1.355+- 0.160   3.012+- 0.471    1.355+- 0.166  1.000+-0.173  S
   7  CL      *      0.265+- 0.035   0.590+- 0.099    0.369+- 0.116  1.391+-0.752  CL
   8  K       *      0.256+- 0.031   0.570+- 0.090    0.195+- 0.143  0.761+-0.699  K
   9  CA      *      0.094+- 0.012   0.208+- 0.034    0.074+- 0.048  0.793+-0.659  CA
  10  TI      *      0.020+- 0.003   0.045+- 0.008    0.017+- 0.011  0.859+-0.731  TI
  11  V       *      0.009+- 0.002   0.019+- 0.004    0.008+- 0.002  0.892+-0.235  V
  12  MN             0.015+- 0.002   0.034+- 0.006    0.003+- 0.000  0.165+-0.021  MN
  13  FE      *      0.688+- 0.079   1.530+- 0.235    0.146+- 0.054  0.213+-0.081  FE
  14  NI      *      0.010+- 0.002   0.022+- 0.005    0.011+- 0.002  1.163+-0.381  NI
  15  CU             0.013+- 0.002   0.028+- 0.006    0.000+- 0.000  0.035+-0.019  CU
  16  ZN      *      0.049+- 0.006   0.110+- 0.018    0.049+- 0.008  1.000+-0.236  ZN
  17  AS             0.035+- 0.009   0.078+- 0.023    0.000+- 0.000  0.000+-0.006  AS
  18  BR      *      0.138+- 0.016   0.306+- 0.047    0.162+- 0.055  1.177+-0.614  BR
  19  SR             0.003+- 0.001   0.006+- 0.003    0.000+- 0.000  0.124+-0.092  SR
  20  CD                   <  0.207         <  0.461  0.001+- 0.001  0.000+-0.000  CD
  21  PB      *      0.392+- 0.045   0.872+- 0.134    0.419+- 0.063  1.068+-0.233  PB
  22  OC            -1.000+--1.000  -1.000+--1.000   11.026+- 2.824  1.068+-0.000  OC
  23  EC            -1.000+--1.000  -1.000+--1.000    3.398+- 1.736  1.068+-0.000  EC
 ---------------------------------------------------------------------------------
MEAS  AMB. MASS (UG/M3):  FINE:  45.0+- 4.6
```

```
CMBDEQ RESULTS FOR CMB # 010015
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 209   SITE: SITE 9   SITE CODE: 0000009
SAMPLING DURATION: 15 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.408 DEGREES OF FREEDOM:  4
 CODE SOURCE FLG      UG/M3                 %
-------------------------------------------------------------------------------------
  1    RESWD    *  32.515+-23.716   61.357+-45.204
  4    TRANS    *   3.575+- 0.594    6.747+- 1.321
  5    RDOIL    *   0.109+- 0.034    0.206+- 0.069
  8    RDUST    *   0.841+- 0.128    1.587+- 0.292
 11    MARIN    *   0.849+- 0.177    1.603+- 0.374
 14    ALUMP    *   0.289+- 0.144    0.545+- 0.278
 13    SECSO    *   4.319+- 0.874    8.150+- 1.853
 19    GALVN    *   0.062+- 0.022    0.117+- 0.043
-------------------------------------------------------------------------------------
      TOTAL:       42.560+-23.741   80.312+-45.568

SPECIE      FIT            FINE  SUSPENDED PARTICULATE
CODE        FLG      MEAS. UG/M3        PERCENT          CALC. UG/M3         RATIO
-------------------------------------------------------------------------------------
  1  NA      *       0.392+- 0.056   0.739+- 0.131    0.382+- 0.037  0.976+-0.134  NA
  2  MG              0.023+- 0.018   0.044+- 0.034    0.114+- 0.037  4.918+-7.979  MG
  3  AL      *       0.182+- 0.025   0.344+- 0.060    0.184+- 0.025  1.009+-0.197  AL
  4  SI      *       0.253+- 0.030   0.478+- 0.076    0.253+- 0.017  0.999+-0.095  SI
  5  P               0.104+- 0.013   0.197+- 0.032    0.003+- 0.000  0.027+-0.004  P
  6  S       *       1.674+- 0.200   3.160+- 0.500    1.674+- 0.203  1.000+-0.171  S
  7  CL      *       0.514+- 0.065   0.971+- 0.159    0.593+- 0.188  1.154+-0.558  CL
  8  K       *       0.352+- 0.042   0.665+- 0.106    0.299+- 0.228  0.847+-0.847  K
  9  CA              0.040+- 0.007   0.076+- 0.015    0.085+- 0.059  2.126+-3.435  CA
 10  TI              0.010+- 0.002   0.020+- 0.005    0.015+- 0.013  1.464+-2.236  TI
 11  V       *       0.003+- 0.001   0.006+- 0.003    0.004+- 0.001  1.378+-0.491  V
 12  MN              0.008+- 0.002   0.015+- 0.004    0.001+- 0.000  0.158+-0.044  MN
 13  FE      *       0.135+- 0.017   0.254+- 0.042    0.113+- 0.064  0.837+-0.621  FE
 14  NI      *       0.009+- 0.002   0.016+- 0.005    0.006+- 0.001  0.736+-0.198  NI
 15  CU              0.011+- 0.002   0.021+- 0.005    0.000+- 0.000  0.025+-0.030  CU
 16  ZN      *       0.066+- 0.008   0.124+- 0.021    0.066+- 0.013  1.000+-0.273  ZN
 17  AS                    < 0.158         < 0.298    0.000+- 0.000  0.000+-0.000  AS
 18  BR      *       0.178+- 0.021   0.336+- 0.052    0.192+- 0.065  1.080+-0.536  BR
 19  SR                    < 0.028         < 0.053    0.000+- 0.000  0.000+-0.000  SR
 20  CD                    < 0.202         < 0.382    0.000+- 0.001  0.000+-0.000  CD
 21  PB      *       0.502+- 0.058   0.948+- 0.147    0.494+- 0.074  0.985+-0.207  PB
 22  OC             -1.000+--1.000  -1.000+--1.000   17.015+- 4.498  0.985+-0.000  OC
 23  EC             -1.000+--1.000  -1.000+--1.000    5.096+- 2.753  0.985+-0.000  EC
-------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  53.0+- 5.5
```

096<

```
CMBDEQ RESULTS FOR CMB # 010005
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801018   SITE: SITE10   SITE CODE: 0000000
SAMPLING DURATION: 24 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    1.352 DEGREES OF FREEDOM:  4
 CODE SOURCE FLG     UG/M3                %
 ----------------------------------------------------------------------------------------
   1    RESWD    *  20.400+-15.317   46.383+-35.146
   4    TRANS    *   6.067+- 1.001   13.795+- 2.678
   5    RDOIL    *   0.317+- 0.064    0.721+- 0.162
   8    RDUST    *   0.499+- 0.100    1.134+- 0.255
  11    MARIN    *   0.547+- 0.127    1.243+- 0.314
  14    ALUMP    *   0.385+- 0.154    0.876+- 0.362
  18    SECSO    *   4.724+- 1.175   10.742+- 2.889
  19    GALVN    *   0.031+- 0.015    0.070+- 0.035
 ----------------------------------------------------------------------------------------
        TOTAL:      32.970+-15.396   74.963+-35.834

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------------
   1  NA        *     0.289+- 0.042   0.656+- 0.116     0.263+- 0.025  0.909+-0.118  NA
   2  MG                   <  0.540          <  1.227     0.110+- 0.049  0.000+-0.000  MG
   3  AL        *     0.173+- 0.024   0.394+- 0.067     0.174+- 0.032  1.004+-0.264  AL
   4  SI        *     0.177+- 0.021   0.402+- 0.063     0.176+- 0.016  0.998+-0.129  SI
   5  P               0.109+- 0.013   0.248+- 0.039     0.002+- 0.000  0.015+-0.002  P
   6  S         *     1.901+- 0.223   4.323+- 0.673     1.901+- 0.314  1.000+-0.233  S
   7  CL        *     0.273+- 0.037   0.620+- 0.105     0.470+- 0.127  1.724+-0.925  CL
   8  K         *     0.313+- 0.037   0.712+- 0.111     0.188+- 0.143  0.602+-0.532  K
   9  CA              0.067+- 0.009   0.153+- 0.026     0.103+- 0.095  1.527+-2.569  CA
  10  TI              0.006+- 0.001   0.013+- 0.004     0.022+- 0.022  3.748+-$14.7  TI
  11  V         *     0.014+- 0.002   0.033+- 0.006     0.011+- 0.002  0.788+-0.211  V
  12  MN              0.003+- 0.001   0.008+- 0.002     0.001+- 0.000  0.260+-0.069  MN
  13  FE        *     0.086+- 0.011   0.196+- 0.032     0.148+- 0.109  1.722+-2.513  FE
  14  NI        *     0.014+- 0.002   0.031+- 0.007     0.018+- 0.004  1.293+-0.460  NI
  15  CU              0.008+- 0.002   0.019+- 0.004     0.000+- 0.000  0.054+-0.028  CU
  16  ZN        *     0.039+- 0.005   0.089+- 0.015     0.039+- 0.009  1.000+-0.340  ZN
  17  AS                   <  0.259          <  0.590     0.000+- 0.000  0.000+-0.000  AS
  18  BR        *     0.368+- 0.042   0.836+- 0.127     0.324+- 0.110  0.881+-0.398  BR
  19  SR              0.002+- 0.001   0.006+- 0.003     0.000+- 0.000  0.041+-0.089  SR
  20  CD                   <  0.204          <  0.464     0.000+- 0.000  0.000+-0.000  CD
  21  PB        *     0.873+- 0.099   1.985+- 0.303     0.838+- 0.126  0.960+-0.199  PB
  22  OC             -1.000+--1.000  -1.000+--1.000    12.362+- 2.864  0.960+-0.000  OC
  23  EC             -1.000+--1.000  -1.000+--1.000     4.196+- 1.811  0.960+-0.000  EC
 ----------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  44.0+- 4.5
```

```
CMBDEQ RESULTS FOR CMB # 010006
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 104   SITE: SITE10   SITE CODE: 0000000
SAMPLING DURATION: 22 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.202 DEGREES OF FREEDOM:  5
 CODE SOURCE FLG     UG/M3                %
 ------------------------------------------------------------------------------------
  1    RESWD   *  31.381+-21.082   82.560+-56.117
  4    TRANS   *   2.601+- 0.431    6.842+- 1.337
  5    RDOIL   *   0.225+- 0.048    0.591+- 0.140
  8    RDUST   *   0.427+- 0.071    1.122+- 0.219
 11    MARIN   *   0.404+- 0.105    1.062+- 0.298
 14    ALUMP   *   0.275+- 0.115    0.724+- 0.313
 18    SECSO   *   3.648+- 0.702    9.598+- 2.097
 19    GALVN   *   0.034+- 0.019    0.089+- 0.051
 ------------------------------------------------------------------------------------
       TOTAL:     38.993+-21.099  102.586+-56.512

SPECIE      FIT           FINE  SUSPENDED PARTICULATE
CODE        FLG     MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
------------------------------------------------------------------------------------
  1   NA     *     0.204+- 0.029   0.537+- 0.095    0.207+- 0.022  1.012+-0.157  NA
  2   MG                <  0.266           <  0.699    0.078+- 0.031  0.000+-0.000  MG
  3   AL     *     0.134+- 0.018   0.352+- 0.061    0.133+- 0.023  0.995+-0.246  AL
  4   SI     *     0.136+- 0.016   0.357+- 0.057    0.135+- 0.010  0.995+-0.100  SI
  5   P            0.094+- 0.011   0.248+- 0.039    0.001+- 0.000  0.015+-0.004  P
  6   S      *     1.412+- 0.166   3.714+- 0.582    1.412+- 0.156  1.000+-0.157  S
  7   CL     *     0.451+- 0.056   1.188+- 0.191    0.386+- 0.166  0.855+-0.484  CL
  8   K      *     0.270+- 0.032   0.711+- 0.112    0.280+- 0.220  1.036+-1.170  K
  9   CA     *     0.041+- 0.006   0.108+- 0.020    0.065+- 0.045  1.591+-2.041  CA
 10   TI           0.002+- 0.001   0.006+- 0.003    0.011+- 0.010  5.027+-$23.5  TI
 11   V      *     0.009+- 0.002   0.024+- 0.005    0.008+- 0.002  0.896+-0.256  V
 12   MN           0.001+- 0.001   0.004+- 0.002    0.001+- 0.000  0.537+-0.263  MN
 13   FE     *     0.053+- 0.007   0.139+- 0.024    0.077+- 0.047  1.464+-1.565  FE
 14   NI     *     0.011+- 0.002   0.030+- 0.007    0.013+- 0.003  1.111+-0.363  NI
 15   CU           0.008+- 0.002   0.020+- 0.005    0.000+- 0.000  0.043+-0.043  CU
 16   ZN     *     0.042+- 0.005   0.111+- 0.018    0.042+- 0.012  1.000+-0.401  ZN
 17   AS                <  0.163           <  0.429    0.000+- 0.000  0.000+-0.000  AS
 18   BR     *     0.139+- 0.016   0.365+- 0.057    0.139+- 0.047  1.004+-0.481  BR
 19   SR           0.002+- 0.001   0.005+- 0.004    0.000+- 0.000  0.044+-0.160  SR
 20   CD                <  0.176           <  0.463    0.000+- 0.000  0.000+-0.000  CD
 21   PB     *     0.370+- 0.043   0.973+- 0.151    0.360+- 0.054  0.973+-0.203  PB
 22   OC          -1.000+--1.000  -1.000+--1.000   16.067+- 4.336  0.973+-0.000  OC
 23   EC          -1.000+--1.000  -1.000+--1.000    4.696+- 2.648  0.973+-0.000  EC
------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  38.0+- 3.9
```

```
CMBDEQ RESULTS FOR CMB # 010007
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 203   SITE: SITE10   SITE CODE: 0000000
SAMPLING DURATION: 24 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.763 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG      UG/M3                 %
 ------------------------------------------------------------------------------------
  1    RESWD   *  35.546+-24.363   96.095+-66.603
  4    TRANS   *   3.546+- 0.586    9.586+- 1.868
  5    RDOIL       0.523+- 0.100    1.414+- 0.306
  8    RDUST       1.648+- 0.173    4.455+- 0.655
 11    MARIN       0.646+- 0.147    1.748+- 0.437
 18    SECSO   *   3.199+- 0.786    8.648+- 2.303
 19    CALVN       0.189+- 0.033    0.510+- 0.104
 ------------------------------------------------------------------------------------
       TOTAL:     45.297+-24.384  122.454+-67.116

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1   NA             0.296+- 0.043    0.801+- 0.143     0.306+- 0.032  1.034+-0.155  NA
   2   MG                   < 0.627          < 1.695     0.109+- 0.041  0.000+-0.000  MG
   3   AL        *    0.218+- 0.027    0.589+- 0.095     0.198+- 0.015  0.911+-0.093  AL
   4   SI        *    0.448+- 0.051    1.211+- 0.186     0.476+- 0.030  1.063+-0.099  SI
   5   P              0.109+- 0.013    0.295+- 0.046     0.005+- 0.001  0.050+-0.006  P
   6   S         *    1.356+- 0.161    3.667+- 0.576     1.356+- 0.198  1.000+-0.206  S
   7   CL        *    0.696+- 0.083    1.881+- 0.296     0.523+- 0.194  0.752+-0.349  CL
   8   K         *    0.223+-- 0.027   0.602+- 0.095     0.328+- 0.249  1.474+-1.991  K
   9   CA             0.062+- 0.008    0.168+- 0.029     0.097+- 0.059  1.560+-1.762  CA
  10   TI             0.024+- 0.004    0.066+- 0.012     0.019+- 0.013  0.786+-0.685  TI
  11   V              0.014+- 0.002    0.038+- 0.007     0.019+- 0.004  1.321+-0.463  V
  12   MN             0.075+- 0.009    0.204+- 0.032     0.003+- 0.000  0.035+-0.006  MN
  13   FE        *    0.468+- 0.054    1.265+- 0.195     0.163+- 0.064  0.349+-0.144  FE
  14   NI        *    0.038+- 0.005    0.102+- 0.018     0.028+- 0.006  0.739+-0.208  NI
  15   CU             0.017+- 0.003    0.047+- 0.009     0.001+- 0.000  0.030+-0.023  CU
  16   ZN             0.170+- 0.020    0.461+- 0.072     0.170+- 0.016  1.000+-0.129  ZN
  17   AS                   < 0.195          < 0.528     0.000+- 0.000  0.000+-0.000  AS
  18   BR        *    0.168+- 0.019    0.454+- 0.070     0.190+- 0.064  1.131+-0.577  BR
  19   SR             0.002+- 0.001    0.006+- 0.004     0.000+- 0.000  0.143+-0.163  SR
  20   CD                   < 0.204          < 0.552     0.001+- 0.001  0.000+-0.000  CD
  21   PB        *    0.505+- 0.058    1.365+- 0.210     0.492+- 0.073  0.974+-0.203  PB
  22   OC            -1.000+--1.000   -1.000+--1.000    18.466+- 4.915  0.974+-0.000  OC
  23   EC            -1.000+--1.000   -1.000+--1.000     5.476+- 3.005  0.974+-0.000  EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  37.0+- 3.8
```

```
CMBDEQ RESULTS FOR CMB # 010016
. FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801117   SITE: SITE11   SITE CODE: 0000001
SAMPLING DURATION: 24 HRS  WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.822 DEGREES OF FREEDOM:  4
 CODE SOURCE FLG      UG/M3                 %
 ----------------------------------------------------------------------------------------------
  1   RESWD   *  51.671+-32.300   99.385+-62.942
  4   TRANS   *   2.264+- 0.379    4.354+- 0.852
  5   RDOIL   *   0.036+- 0.024    0.070+- 0.047
  9   RDUST   *   1.302+- 0.142    2.504+- 0.373
 18   SECSO   *   3.660+- 0.729    7.040+- 1.574
 ----------------------------------------------------------------------------------------------
      TOTAL      58.933+-32.311  113.353+-63.205

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------------------
   1  NA              0.076+- 0.011    0.146+- 0.027     0.044+- 0.024   0.581+-0.362   NA
   2  MG              0.024+- 0.011    0.046+- 0.021     0.081+- 0.041   3.409+-6.145   MG
   3  AL         *    0.189+- 0.024    0.364+- 0.059     0.158+- 0.015   0.834+-0.102   AL
   4  SI         *    0.352+- 0.040    0.677+- 0.104     0.378+- 0.026   1.073+-0.107   SI
   5  P               0.093+- 0.011    0.178+- 0.028     0.004+- 0.001   0.042+-0.007   P
   6  S          *    1.400+- 0.165    2.693+- 0.413     1.400+- 0.165   1.000+-0.166   S
   7  CL         *    0.431+- 0.053    0.830+- 0.133     0.318+- 0.264   0.736+-0.759   CL
   8  K          *    0.220+- 0.026    0.422+- 0.067     0.465+- 0.362   2.116+-3.854   K
   9  CA              0.065+- 0.009    0.125+- 0.021     0.072+- 0.047   1.106+-1.073   CA
  10  TI              0.005+- 0.001    0.010+- 0.003     0.013+- 0.008   2.416+-4.071   TI
  11  V                     <  0.016           <  0.031  0.002+- 0.001   0.000+-0.000   V
  12  MN              0.003+- 0.001    0.007+- 0.002     0.003+- 0.001   0.924+-0.236   MN
  13  FE         *    0.068+- 0.009    0.131+- 0.022     0.112+- 0.041   1.643+-1.154   FE
  14  NI         *    0.002+- 0.001    0.004+- 0.002     0.002+- 0.001   0.991+-0.461   NI
  15  CU              0.004+- 0.001    0.009+- 0.002     0.000+- 0.001   0.058+-0.117   CU
  16  ZN              0.032+- 0.004    0.062+- 0.010     0.022+- 0.019   0.677+-0.725   ZN
  17  AS                    <  0.161           <  0.310  0.000+- 0.001   0.000+-0.000   AS
  18  BR         *    0.123+- 0.014    0.236+- 0.036     0.120+- 0.041   0.982+-0.462   BR
  19  SR              0.003+- 0.001    0.005+- 0.003     0.000+- 0.001   0.068+-0.206   SR
  20  CD                    <  0.207           <  0.398  0.001+- 0.001   0.000+-0.000   CD
  21  PB         *    0.323+- 0.037    0.622+- 0.096     0.314+- 0.047   0.970+-0.202   PB
  22  OC             -1.000+--1.000   -1.000+--1.000    25.523+- 7.133   0.970+-0.000   OC
  23  EC             -1.000+--1.000   -1.000+--1.000     7.205+- 4.346   0.970+-0.000   EC
 ----------------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  52.0+- 5.3
```

```
CMBDEQ RESULTS FOR CMB # 010017
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801211   SITE: SITE11   SITE CODE: 000001
SAMPLING DURATION: 23 HRS  WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING   REDUCED CHI SQUARE:   0.543 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                %
 ------------------------------------------------------------------------------
  1    RESWD   *  55.146+-32.401   76.602+-45.665
  4    TRANS   *   2.675+- 0.436    3.716+- 0.713
  5    RDOIL   *   0.070+- 0.026    0.098+- 0.037
  9    RDUST   *   3.230+- 0.303    4.487+- 0.618
 13    SEC30   *   3.925+- 0.799    5.452+- 1.239
 ------------------------------------------------------------------------------
       TOTAL:     65.047+-32.415   90.355+-45.939

 SPECIE       FIT             FINE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS  UG/M3        PERCENT           CALC  UG/M3          RATIO
 ------------------------------------------------------------------------------------------
   1  NA               0.156+- 0.023   0.216+- 0.039     0.048+- 0.025   0.310+-0.171   NA
   2  MG               0.069+- 0.025   0.096+- 0.036     0.124+- 0.045   1.783+-1.333   MG
   3  AL          *    0.334+- 0.040   0.465+- 0.072     0.371+- 0.028   1.110+-0.124   AL
   4  SI          *    0.976+- 0.110   1.355+- 0.205     0.920+- 0.063   0.943+-0.088   SI
   5  P                0.102+- 0.012   0.142+- 0.022     0.010+- 0.001   0.095+-0.011   P
   6  S           *    1.522+- 0.178   2.114+- 0.327     1.522+- 0.185   1.000+-0.172   S
   7  CL          *    0.513+- 0.062   0.712+- 0.112     0.347+- 0.281   0.677+-0.663   CL
   8  K           *    0.267+- 0.032   0.371+- 0.058     0.524+- 0.386   1.962+-3.182   K
   9  CA          *    0.134+- 0.016   0.186+- 0.029     0.095+- 0.053   0.711+-0.487   CA
  10  TI          *    0.032+- 0.004   0.045+- 0.008     0.023+- 0.010   0.712+-0.381   TI
  11  V           *    0.004+- 0.001   0.006+- 0.002     0.003+- 0.001   0.733+-0.231   V
  12  MN               0.009+- 0.002   0.012+- 0.003     0.008+- 0.001   0.875+-0.133   MN
  13  FE          *    0.240+- 0.028   0.333+- 0.052     0.222+- 0.049   0.927+-0.291   FE
  14  NI          *    0.003+- 0.001   0.004+- 0.002     0.004+- 0.001   1.286+-0.535   NI
  15  CU               0.014+- 0.002   0.019+- 0.004     0.001+- 0.001   0.045+-0.043   CU
  16  ZN               0.094+- 0.011   0.130+- 0.020     0.024+- 0.021   0.255+-0.226   ZN
  17  AS                      <  0.169          <  0.234     0.000+- 0.001   0.000+-0.000   AS
  18  BR          *    0.130+- 0.015   0.181+- 0.028     0.142+- 0.048   1.095+-0.552   BR
  19  SR               0.003+- 0.001   0.004+- 0.002     0.000+- 0.001   0.136+-0.231   SR
  20  CD                      <  0.202          <  0.281     0.002+- 0.002   0.000+-0.000   CD
  21  PB          *    0.362+- 0.042   0.503+- 0.077     0.373+- 0.055   1.029+-0.219   PB
  22  OC              -1.000+--1.000  -1.000+--1.000    27.355+- 7.614   1.029+-0.000   OC
  23  EC              -1.000+--1.000  -1.000+--1.000     7.757+- 4.639   1.029+-0.000   EC
 ------------------------------------------------------------------------------------------
 MEAS  AMB  MASS (UG/M3):  FINE:  72.0+- 7.3
```

```
CMBDEQ RESULTS FOR CMB # 010018
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801219    SITE: SITE11    SITE CODE: 000000l
SAMPLING DURATION: 24 HRS  WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    1.088 DEGREES OF FREEDOM:  3
 CODE SOURCE FLG      UG/M3                    %
 -------------------------------------------------------------------------------------------
  1    RESWD    *  48.064+-37.734    98.127+-77.682
  4    TRANS    *   2.592+- 0.435     5.291+- 1.038
  5    RDOIL    *   0.035+- 0.024     0.072+- 0.049
  9    RDUST    *   1.000+- 0.115     2.041+- 0.313
 18    SECSO    *   2.222+- 0.641     4.535+- 1.389
 -------------------------------------------------------------------------------------------
       TOTAL:      53.912+-37.742   110.066+-77.863

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 -------------------------------------------------------------------------------------------
   1  NA               0.113+- 0.017   0.231+- 0.041    0.041+- 0.022   0.363+-0.208   NA
   2  MG               0.024+- 0.013   0.050+- 0.028    0.076+- 0.040   3.116+-5.369   MG
   3  AL       *       0.157+- 0.020   0.320+- 0.053    0.124+- 0.013   0.790+-0.104   AL
   4  SI       *       0.268+- 0.031   0.548+- 0.084    0.295+- 0.020   1.101+-0.112   SI
   5  P                0.085+- 0.010   0.174+- 0.028    0.003+- 0.001   0.035+-0.007   P
   6  S        *       0.930+- 0.112   1.900+- 0.300    0.931+- 0.165   1.000+-0.250   S
   7  CL               0.967+- 0.113   1.975+- 0.306    0.307+- 0.245   0.317+-0.266   CL
   8  K        *       0.273+- 0.032   0.557+- 0.087    0.429+- 0.336   1.573+-2.301   K
   9  CA               0.044+- 0.006   0.090+- 0.016    0.071+- 0.049   1.618+-2.143   CA
  10  TI               0.006+- 0.001   0.012+- 0.003    0.013+- 0.010   2.238+-4.132   TI
  11  V                       <  0.016          <  0.033    0.001+- 0.001   0.000+-0.000   V
  12  MN               0.004+- 0.001   0.008+- 0.002    0.002+- 0.001   0.619+-0.159   MN
  13  FE       *       0.068+- 0.009   0.139+- 0.024    0.102+- 0.047   1.492+-1.226   FE
  14  NI       *       0.002+- 0.001   0.004+- 0.002    0.002+- 0.001   0.995+-0.457   NI
  15  CU               0.007+- 0.001   0.014+- 0.003    0.000+- 0.000   0.031+-0.073   CU
  16  ZN               0.151+- 0.018   0.309+- 0.048    0.021+- 0.018   0.136+-0.120   ZN
  17  AS                      <  0.173          <  0.353    0.000+- 0.000   0.000+-0.000   AS *
  18  BR       *       0.126+- 0.015   0.258+- 0.040    0.138+- 0.047   1.091+-0.549   BR
  19  SR               0.002+- 0.001   0.005+- 0.003    0.000+- 0.000   0.059+-0.214   SR
  20  CD                      <  0.184          <  0.375    0.001+- 0.001   0.000+-0.000   CD
  21  PB       *       0.378+- 0.044   0.772+- 0.119    0.359+- 0.054   0.948+-0.195   PB
  22  OC              -1.000+--1.000  -1.000+--1.000   23.951+- 6.637   0.948+-0.000   OC
  23  EC              -1.000+--1.000  -1.000+--1.000    6.929+- 4.045   0.948+-0.000   EC
 -------------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  49.0+- 5.0
```

```
CMBDEQ RESULTS FOR CMB # 010019
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 221   SITE: SITE11   SITE CODE: 0000001
SAMPLING DURATION: 24 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.198 DEGREES OF FREEDOM:  2
 CODE SOURCE FLG      UG/M3            .      %
 ---------------------------------------------------------------------------------------
  1    RESWD    *  45.205+-37.205  107.678+-89.305
  4    TRANS    *   2.142+- 0.360    5.101+- 1.003
  9    RDUST        1.077+- 0.149    2.565+- 0.442
 19    SECSO    *   1.652+- 0.549    3.936+- 1.368
 ---------------------------------------------------------------------------------------
       TOTAL:      50.076+-37.211  119.280+-89.473

 SPECIE      FIT       .       FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ---------------------------------------------------------------------------------------
   1   NA     *      0.249+- 0.036   0.594+- 0.104    0.038+- 0.021   0.151+-0.084   NA
   2   MG            0.023+- 0.011   0.055+- 0.028    0.072+- 0.037   3.082+-5.110   MG
   3   AL     *      0.169+- 0.021   0.404+- 0.066    0.131+- 0.013   0.774+-0.094   AL
   4   SI     *      0.318+- 0.037   0.759+- 0.117    0.314+- 0.021   0.986+-0.094   SI
   5   P             0.074+- 0.009   0.176+- 0.028    0.003+- 0.001   0.044+-0.008   P
   6   S      *      0.715+- 0.088   1.704+- 0.273    0.715+- 0.142   1.000+-0.281   S
   7   CL     *      0.439+- 0.054   1.046+- 0.167    0.282+- 0.231   0.641+-0.624   CL
   8   K      *      0.405+- 0.047   0.966+- 0.150    0.405+- 0.316   1.000+-1.104   K
   9   CA     *      0.063+- 0.009   0.151+- 0.026    0.064+- 0.043   1.008+-0.960   CA
  10   TI     *      0.010+- 0.002   0.025+- 0.005    0.012+- 0.008   1.128+-1.163   TI
  11   V      *      0.002+- 0.001   0.005+- 0.002    0.000+- 0.000   0.141+-0.246   V
  12   MN            0.004+- 0.001   0.009+- 0.003    0.003+- 0.001   0.680+-0.162   MN
  13   FE     *      0.076+- 0.010   0.182+- 0.031    0.096+- 0.039   1.261+-0.811   FE
  14   NI     *            <  0.019         <  0.046    0.000+- 0.000   0.000+-0.000   NI
  15   CU            0.004+- 0.001   0.009+- 0.003    0.000+- 0.000   0.050+-0.118   CU
  16   ZN     *      0.044+- 0.006   0.104+- 0.017    0.019+- 0.017   0.434+-0.421   ZN
  17   AS                  <  0.158         <  0.376    0.000+- 0.000   0.000+-0.000   AS
  18   BR     *      0.103+- 0.012   0.245+- 0.039    0.114+- 0.039   1.106+-0.561   BR
  19   SR            0.004+- 0.001   0.009+- 0.003    0.000+- 0.000   0.040+-0.129   SR
  20   CD                  <  0.194         <  0.463    0.001+- 0.001   0.000+-0.000   CD
  21   PB     *      0.311+- 0.036   0.740+- 0.114    0.297+- 0.044   0.955+-0.197   PB
  22   OC           -1.000+--1.000  -1.000+--1.000   22.396+- 6.241   0.955+-0.000   OC
  23   EC           -1.000+--1.000  -1.000+--1.000    6.346+- 3.803   0.955+-0.000   EC
 ---------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  42.0+- 4.3
```

```
CMBDEQ RESULTS FOR CMB # 010008
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 811211   SITE: SITE12   SITE CODE: 0000002
SAMPLING DURATION: 24 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.688 DEGREES OF FREEDOM:  5
 CODE SOURCE FLG      UG/M3                  %
 ----------------------------------------------------------------------------------
  1    RESWD    *  26.506+-20.991   75.732+-60.483
  4    TRANS    *   1.316+- 0.228    3.761+- 0.759
  5    RDOIL    *   0.934+- 0.175    2.669+- 0.572
  7    RDUST    *   0.698+- 0.108    1.995+- 0.372
 14    ALUMP    *   0.150+- 0.114    0.428+- 0.328
 15    KRAFT    *   6.087+- 1.052   17.391+- 3.502
 18    SEC30    *   1.495+- 0.707    4.271+- 2.069
 19    GALVN    *   0.032+- 0.017    0.090+- 0.051
 ----------------------------------------------------------------------------------
       TOTAL:      37.218+-21.031  106.338+-61.088

 SPECIE       FIT            FINE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------
   1  NA       *      0.933+- 0.133    2.667+- 0.470     0.943+- 0.048   0.903+-0.069  NA
   2  MG              0.094+- 0.037    0.269+- 0.110     0.082+- 0.048   0.875+-0.678  MG
   3  AL       *      0.130+- 0.017    0.371+- 0.062     0.130+- 0.023   1.000+-0.253  AL
   4  SI       *      0.191+- 0.022    0.546+- 0.086  *  0.182+- 0.009   0.953+-0.068  SI
   5  P               0.081+- 0.010    0.232+- 0.037     0.000+- 0.000   0.000+-0.003  P
   6  S        *      1.434+- 0.168    4.098+- 0.640     1.434+- 0.109   1.000+-0.108  S
   7  CL              0.734+- 0.087    2.098+- 0.329     0.277+- 0.138   0.378+-0.200  CL
   8  K        *      0.338+- 0.040    0.967+- 0.151     0.329+- 0.186   0.973+-0.766  K
   9  CA       *      0.051+- 0.007    0.145+- 0.026     0.065+- 0.040   1.293+-1.308  CA
  10  TI       *      0.009+- 0.002    0.025+- 0.006     0.010+- 0.005   1.178+-0.892  TI
  11  V        *      0.035+- 0.004    0.099+- 0.016     0.032+- 0.007   0.933+-0.275  V
  12  MN              0.009+- 0.002    0.027+- 0.005     0.003+- 0.000   0.333+-0.045  MN
  13  FE       *      0.125+- 0.015    0.356+- 0.058     0.168+- 0.026   1.345+-0.343  FE
  14  NI       *      0.059+- 0.008    0.168+- 0.028     0.058+- 0.011   0.991+-0.271  NI
  15  CU              0.099+- 0.012    0.283+- 0.045     0.002+- 0.001   0.023+-0.009  CU
  16  ZN       *      0.045+- 0.006    0.129+- 0.021     0.045+- 0.010   1.000+-0.319  ZN
  17  AS                    <  0.128           <  0.365  0.000+- 0.000   0.000+-0.000  AS
  18  BR       *      0.066+- 0.008    0.190+- 0.030     0.078+- 0.024   1.179+-0.561  BR
  19  SR              0.002+- 0.001    0.006+- 0.003     0.000+- 0.000   0.000+-0.124  SR
  20  CD                    <  0.179           <  0.512  0.000+- 0.000   0.000+-0.000  CD
  21  PB       *      0.206+- 0.024    0.589+- 0.092     0.186+- 0.027   0.903+-0.178  PB
  22  OC             -1.000+--1.000   -1.000+--1.000    13.474+- 3.661   0.903+-0.000  OC
  23  EC             -1.000+--1.000   -1.000+--1.000     3.737+- 2.230   0.903+-0.000  EC
 ----------------------------------------------------------------------------------
MEAS. WMB. MASS (UG/M3):  FINE:  35.0+- 3.6
```

```
CMBDED RESULTS FOR CMB # 010009
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 193   SITE: SITE12   SITE CODE: 0000002
SAMPLING DURATION: 24 HRS  WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING   REDUCED CHI SQUARE:    0.441 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG      UG/M3                %
-----------------------------------------------------------------------------------
  1   RESWD   *  14.265+- 9.216   35.663+-23.328
  4   TRANS   *   1.518+- 0.256    3.795+- 0.749
  5   RDOIL   *   0.172+- 0.039    0.430+- 0.106
  7   RDUST   *   0.736+- 0.102    1.840+- 0.318
 14   ALUMP   *   0.180+- 0.116    0.450+- 0.293
 15   KRAFT   *   1.229+- 0.252    3.072+- 0.705
 18   SECSO   *   2.097+- 0.447    5.241+- 1.240
 19   GALVN   *   0.034+- 0.010    0.084+- 0.027
-----------------------------------------------------------------------------------
      TOTAL:     20.230+- 9.235   50.575+-23.664

SPECIE      FIT              FINE  SUSPENDED PARTICULATE
CODE        FLG       MEAS  UG/M3         PERCENT          CALC. UG/M3         RATIO
-----------------------------------------------------------------------------------
  1   NA     *      0.194+- 0.028     0.485+- 0.086     0.190+- 0.012   0.981+-0.086   NA
  2   MG                  <  0.235           <  0.587     0.046+- 0.018   0.000+-0.000   MG
  3   AL     *      0.123+- 0.016     0.308+- 0.051     0.123+- 0.025   0.996+-0.294   AL
  4   SI     *      0.183+- 0.021     0.457+- 0.071     0.177+- 0.009   0.969+-0.067   SI
  5   P             0.058+- 0.007     0.146+- 0.024     0.000+- 0.000   0.000+-0.002   P
  6   S      *      0.949+- 0.114     2.373+- 0.374     0.949+- 0.089   1.000+-0.132   S
  7   CL     *      0.147+- 0.021     0.367+- 0.066     0.133+- 0.074   0.905+-0.678   CL
  8   K      *      0.135+- 0.017     0.338+- 0.055     0.150+- 0.100   1.105+-1.099   K
  9   CA     *      0.045+- 0.006     0.113+- 0.020     0.049+- 0.026   1.073+-0.841   CA
 10   TI     *      0.004+- 0.001     0.009+- 0.003     0.010+- 0.006   2.751+-4.625   TI
 11   V      *      0.008+- 0.001     0.019+- 0.004     0.006+- 0.001   0.817+-0.221   V
 12   MN            0.020+- 0.003     0.050+- 0.009     0.001+- 0.000   0.068+-0.010   MN
 13   FE     *      0.080+- 0.010     0.199+- 0.033     0.093+- 0.028   1.167+-0.533   FE
 14   NI     *      0.009+- 0.002     0.023+- 0.005     0.011+- 0.002   1.200+-0.352   NI
 15   CU            0.039+- 0.005     0.098+- 0.016     0.001+- 0.000   0.017+-0.006   CU
 16   ZN     *      0.036+- 0.005     0.090+- 0.015     0.036+- 0.006   1.000+-0.221   ZN
 17   AS                  <  0.134           <  0.335     0.000+- 0.000   0.000+-0.000   AS
 18   BR     *      0.078+- 0.009     0.194+- 0.030     0.083+- 0.027   1.064+-0.517   BR
 19   SR            0.002+- 0.001     0.006+- 0.003     0.000+- 0.000   0.000+-0.058   SR
 20   CD                  <  0.153           <  0.382     0.000+- 0.000   0.000+-0.000   CD
 21   PB     *      0.228+- 0.027     0.569+- 0.089     0.213+- 0.031   0.933+-0.189   PB
 22   OC           -1.000+--1.000    -1.000+--1.000     7.583+- 1.973   0.933+-0.000   OC
 23   EC           -1.000+--1.000    -1.000+--1.000     2.222+- 1.207   0.933+-0.000   EC
-----------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  40.0+- 4.1
```

```
CMBDEQ RESULTS FOR CMB # 010010
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 110   SITE: SITE12   SITE CODE: 0000002
SAMPLING DURATION: 24 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.583 DEGREES OF FREEDOM:  5
 CODE SOURCE FLG      UG/M3                %
 ---------------------------------------------------------------------------------
  1    RESWD   *  21.231+-16.978   35.384+-28.522
  4    TRANS   *   1.861+- 0.322    3.102+- 0.622
  5    RDOIL   *   0.178+- 0.047    0.297+- 0.084
  7    RDUST   *   0.886+- 0.132    1.477+- 0.266
 14    ALUMP   *   1.202+- 0.415    2.003+- 0.721
 15    KRAFT   *   3.525+- 0.723    5.874+- 1.344
 18    SECSO   *   3.349+- 0.740    5.582+- 1.356
 19    GALVN   *   0.047+- 0.015    0.079+- 0.027
 ---------------------------------------------------------------------------------
       TOTAL:     32.279+-17.018   53.798+-28.881

 SPECIE      FIT            FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT         CALC. UG/M3        RATIO
 ---------------------------------------------------------------------------------
   1  NA       *      0.595+- 0.085    0.991+- 0.174     0.532+- 0.034  0.894+-0.077  NA
   2  MG              0.080+- 0.034    0.133+- 0.058     0.099+- 0.036  1.236+-0.711  MG
   3  AL       *      0.425+- 0.049    0.708+- 0.109     0.420+- 0.099  0.988+-0.328  AL
   4  SI       *      0.238+- 0.028    0.396+- 0.061     0.220+- 0.011  0.925+-0.065  SI
   5  P               0.116+- 0.014    0.194+- 0.030     0.000+- 0.000  0.000+-0.002  P
   6  S        *      1.673+- 0.195    2.788+- 0.430     1.673+- 0.122  1.000+-0.103  S
   7  CL              1.249+- 0.144    2.082+- 0.320     0.231+- 0.110  0.185+-0.090  CL
   8  K        *      0.249+- 0.030    0.414+- 0.065     0.248+- 0.149  0.996+-0.844  K
   9  CA       *      0.051+- 0.007    0.085+- 0.015     0.064+- 0.036  1.258+-1.140  CA
  10  TI       *      0.006+- 0.001    0.010+- 0.003     0.013+- 0.007  2.019+-2.536  TI
  11  V        *      0.009+- 0.002    0.014+- 0.003     0.007+- 0.001  0.830+-0.215  V
  12  MN              0.005+- 0.001    0.009+- 0.002     0.002+- 0.000  0.454+-0.066  MN
  13  FE       *      0.066+- 0.009    0.110+- 0.019     0.141+- 0.034  2.121+-1.208  FE
  14  NI       *      0.014+- 0.002    0.024+- 0.005     0.016+- 0.002  1.148+-0.261  NI
  15  CU              0.028+- 0.004    0.047+- 0.008     0.002+- 0.001  0.060+-0.019  CU
  16  ZN       *      0.052+- 0.006    0.086+- 0.014     0.052+- 0.008  1.000+-0.226  ZN
  17  AS                    <  0.152         <  0.254     0.000+- 0.000  0.000+-0.000  AS
  18  BR       *      0.088+- 0.010    0.147+- 0.023     0.104+- 0.034  1.185+-0.595  BR
  19  SR              0.002+- 0.001    0.003+- 0.002     0.000+- 0.000  0.000+-0.129  SR
  20  CD                    <  0.182         <  0.304     0.000+- 0.000  0.000+-0.000  CD
  21  PB       *      0.305+- 0.035    0.508+- 0.078     0.261+- 0.039  0.856+-0.166  PB
  22  OC             -1.000+--1.000   -1.000+--1.000    11.168+- 2.935  0.856+-0.000  OC
  23  EC             -1.000+--1.000   -1.000+--1.000     3.204+- 1.792  0.856+-0.000  EC
 ---------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  60.0+- 6.1
```

```
CMBDEQ RESULTS FOR CMB # 010011
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 116    SITE: SITE12   SITE CODE: 0000002
SAMPLING DURATION: 23 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    2.043 DEGREES OF FREEDOM:  6
 CODE SOURCE FLG      UG/M3                 %
------------------------------------------------------------------------------------------
  1    RESWD    *  40.507+-24.160  126.621+-76.663
  4    TRANS    *    1.003+- 0.178     3.136+- 0.645
  5    RDOIL    *    0.578+- 0.115     1.807+- 0.405
  7    RDUST    *    0.704+- 0.109     2.199+- 0.411
 14    ALUMP    *    0.295+- 0.147     0.921+- 0.469
 15    KRAFT    *    5.297+- 1.037    16.559+- 3.671
 18    SECSO    *    2.915+- 0.808     9.113+- 2.697
 19    GALVN    *    0.048+- 0.024     0.149+- 0.076
------------------------------------------------------------------------------------------
     TOTAL:        51.347+-24.197  160.505+-77.462

SPECIE      FIT
CODE        FLG              FINE  SUSPENDED PARTICULATE
                     MEAS. UG/M3           PERCENT         CALC. UG/M3         RATIO
------------------------------------------------------------------------------------------
  1   NA      *      0.995+- 0.142    3.111+- 0.549
  2   MG                   <  0.676              <  2.113    0.747+- 0.043   0.751+-0.055   NA
  3   AL      *      0.168+- 0.021    0.525+- 0.086    0.089+- 0.045   0.000+-0.000   MG
  4   SI      *      0.201+- 0.023    0.627+- 0.098    0.168+- 0.031   1.001+-0.265   AL
  5   P              0.109+- 0.013    0.340+- 0.054    0.177+- 0.009   0.883+-0.057   SI
  6   S       *      1.778+- 0.206    5.559+- 0.866    0.000+- 0.000   0.000+-0.004   P
  7   CL      *      0.331+- 0.042    1.034+- 0.170    1.778+- 0.120   1.000+-0.096   S
  8   K       *      0.339+- 0.040    1.059+- 0.166    0.329+- 0.208   0.995+-0.885   CL
  9   CA      *      0.070+- 0.009    0.219+- 0.037    0.437+- 0.284   1.291+-1.367   K
 10   TI      *      0.005+- 0.001    0.016+- 0.005    0.066+- 0.039   0.944+-0.774   CA
 11   V       *      0.023+- 0.003    0.073+- 0.013    0.009+- 0.004   1.689+-1.449   TI
 12   MN             0.018+- 0.002    0.056+- 0.010    0.020+- 0.004   0.874+-0.249   V
 13   FE      *      0.084+- 0.011    0.262+- 0.044    0.003+- 0.000   0.153+-0.027   MN
 14   NI      *      0.038+- 0.005    0.120+- 0.021    0.143+- 0.020   1.706+-0.465   FE
 15   CU             0.089+- 0.011    0.280+- 0.045    0.038+- 0.007   1.003+-0.261   NI
 16   ZN      *      0.061+- 0.008    0.191+- 0.031    0.002+- 0.001   0.021+-0.009   CU
 17   AS                   <  0.114              <  0.357    0.061+- 0.015   1.000+-0.353   ZN
 18   BR      *      0.056+- 0.007    0.177+- 0.028    0.000+- 0.000   0.000+-0.000   AS
 19   SR                   <  0.024              <  0.076    0.061+- 0.018   1.072+-0.479   BR
 20   CD             0.010+- 0.007    0.030+- 0.023    0.000+- 0.000   0.000+-0.000   SR
 21   PB      *      0.162+- 0.019    0.505+- 0.080    0.000+- 0.000   0.000+-0.043   CD
 22   OC            -1.000+--1.000   -1.000+--1.000    0.142+- 0.021   0.881+-0.172   PB
 23   EC            -1.000+--1.000   -1.000+--1.000   19.948+- 5.591   0.881+-0.000   OC
------------------------------------------------------------------ 5.447+- 3.404   0.881+-0.000   EC
MEAS. AMB. MASS (UG/M3):   FINE:   32.0+- 3.3
```

```
CMBDEQ RESULTS FOR CMB # 010001
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801030   SITE: SITE13   SITE CODE: 0000003
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.450 DEGREES OF FREEDOM:  5
 CODE SOURCE FLG      UG/M3                  %
 ------------------------------------------------------------------------------------
  1    RESWD    *  34.371+-21.346    64.727+-40.732
  4    TRANS    *   2.956+- 0.486     5.567+- 1.076
  5    RDOIL    *   0.032+- 0.030     0.061+- 0.057
  9    RDUST    *   0.890+- 0.131     1.676+- 0.300
 14    ALUMP    *   0.721+- 0.263     1.357+- 0.515
 18    SECSO    *   2.683+- 0.656     5.053+- 1.338
 19    GALVN    *   0.073+- 0.022     0.138+- 0.044
 ------------------------------------------------------------------------------------
       TOTAL:      41.727+-21.364    78.578+-41.015

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG       MEAS. UG/M3         PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1   NA     *        0.186+- 0.027    0.351+- 0.062     0.059+- 0.020   0.318+-0.113   NA
   2   MG              0.031+- 0.012    0.058+- 0.024     0.087+- 0.036   2.853+-3.533   MG
   3   AL     *        0.304+- 0.036    0.573+- 0.090     0.304+- 0.059   0.999+-0.272   AL
   4   SI     *        0.272+- 0.031    0.512+- 0.079     0.269+- 0.019   0.990+-0.096   SI
   5   P               0.078+- 0.010    0.148+- 0.023     0.003+- 0.000   0.034+-0.006   P
   6   S      *        1.082+- 0.130    2.037+- 0.320     1.082+- 0.168   1.000+-0.220   S
   7   CL     *        0.383+- 0.048    0.721+- 0.116     0.255+- 0.177   0.666+-0.555   CL
   8   K      *        0.242+- 0.029    0.455+- 0.072     0.311+- 0.241   1.286+-1.621   K
   9   CA              0.030+- 0.005    0.057+- 0.011     0.068+- 0.050   2.230+-4.053   CA
  10   TI              0.002+- 0.001    0.004+- 0.002     0.014+- 0.011   6.237+-$31.4   TI
  11   V      *        0.002+- 0.001    0.003+- 0.002     0.002+- 0.001   0.994+-0.393   V
  12   MN              0.004+- 0.001    0.008+- 0.002     0.002+- 0.000   0.496+-0.099   MN
  13   FE     *        0.104+- 0.013    0.197+- 0.032     0.106+- 0.053   1.014+-0.724   FE
  14   NI     *            <  0.019         <  0.036      0.003+- 0.001   0.000+-0.000   NI
  15   CU              0.012+- 0.002    0.022+- 0.005     0.001+- 0.000   0.042+-0.030   CU
  16   ZN     *        0.075+- 0.009    0.140+- 0.022     0.075+- 0.013   1.000+-0.252   ZN
  17   AS                  <  0.182         <  0.343      0.000+- 0.000   0.000+-0.000   AS
  18   BR     *        0.164+- 0.019    0.308+- 0.047     0.158+- 0.054   0.962+-0.453   BR
  19   SR              0.001+- 0.001    0.003+- 0.002     0.000+- 0.000   0.080+-0.239   SR
  20   CD              0.025+- 0.009    0.048+- 0.017     0.000+- 0.001   0.019+-0.026   CD
  21   PB     *        0.421+- 0.048    0.793+- 0.122     0.409+- 0.061   0.971+-0.202   PB
  22   OC             -1.000+--1.000   -1.000+--1.000    17.649+- 4.750   0.971+-0.000   OC
  23   EC             -1.000+--1.000   -1.000+--1.000     5.172+- 2.901   0.971+-0.000   EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  53.1+- 5.4
```

```
CMBDEQ RESULTS FOR CMB # 010011
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801117   SITE: SITE14   SITE CODE: 0000004
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.646 DEGREES OF FREEDOM:  3
 CODE SOURCE FLG     UG/M3              %
 ------------------------------------------------------------------------------------
  1   RESWD   *  16.387+-16.655   20.568+-41.135
  4   TRANS   *   1.735+- 0.292    4.263+- 0.839
  9   RDUST   *   0.307+- 0.052    0.754+- 0.149
 12   HOGFU   *   1.257+- 0.385    3.088+- 0.998
 14   ALUMP   *   0.437+- 0.154    1.074+- 0.394
 18   SECSO   *   1.726+- 0.411    4.241+- 1.100
 19   GALVN   *   0.027+- 0.012    0.067+- 0.030
 ------------------------------------------------------------------------------------
      TOTAL:     21.875+-16.668   53.754+-41.328

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3       RATIO
 ------------------------------------------------------------------------------------
   1  NA      *       0.200+- 0.029   0.492+- 0.087    0.207+- 0.039  1.035+-0.281  NA
   2  MG              0.037+- 0.013   0.092+- 0.033    0.045+- 0.019  1.196+-0.800  MG
   3  AL      *       0.160+- 0.021   0.393+- 0.065    0.159+- 0.035  0.995+-0.311  AL
   4  SI      *       0.098+- 0.012   0.242+- 0.039    0.098+- 0.007  0.992+-0.103  SI
   5  P               0.052+- 0.007   0.127+- 0.021    0.001+- 0.000  0.018+-0.004  P
   6  S       *       0.712+- 0.087   1.750+- 0.280    0.712+- 0.100  1.000+-0.198  S
   7  CL      *       0.490+- 0.059   1.205+- 0.191    0.294+- 0.173  0.599+-0.411  CL
   8  K       *       0.198+- 0.024   0.488+- 0.078    0.260+- 0.137  1.308+-1.139  K
   9  CA              0.023+- 0.004   0.057+- 0.012    0.073+- 0.038  3.127+-5.368  CA
  10  TI              0.002+- 0.001   0.005+- 0.003    0.007+- 0.006  3.220+-9.844  TI
  11  V               0.001+- 0.001   0.003+- 0.002    0.000+- 0.000  0.296+-0.200  V
  12  MN              0.002+- 0.001   0.005+- 0.003    0.003+- 0.001  1.735+-1.338  MN
  13  FE      *       0.033+- 0.006   0.082+- 0.016    0.054+- 0.031  1.622+-1.781  FE
  14  NI                    <  0.020          <  0.049    0.001+- 0.000  0.000+-0.000  NI
  15  CU              0.020+- 0.003   0.049+- 0.009    0.001+- 0.000  0.029+-0.009  CU
  16  ZN      *       0.033+- 0.004   0.082+- 0.014    0.033+- 0.006  1.000+-0.275  ZN
  17  AS                    <  0.142          <  0.350    0.000+- 0.000  0.000+-0.000  AS
  18  BR      *       0.083+- 0.010   0.205+- 0.032    0.093+- 0.031  1.112+-0.564  BR
  19  SR                    <  0.031          <  0.076    0.000+- 0.000  0.000+-0.000  SR
  20  CD                    <  0.181          <  0.445    0.000+- 0.000  0.000+-0.000  CD
  21  PB      *       0.251+- 0.029   0.616+- 0.096    0.240+- 0.036  0.958+-0.198  PB
  22  OC             -1.000+--1.000  -1.000+--1.000    8.622+- 2.267  0.958+-0.000  OC
  23  EC             -1.000+--1.000  -1.000+--1.000    2.605+- 1.388  0.958+-0.000  EC
 ------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  40.7+- 4.2
```

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                                                PAGE 0021

CMBDEQ RESULTS FOR CMB # 010014
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801123   SITE: SITE14   SITE CODE: 0000004
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.474 DEGREES OF FREEDOM:  4
 CODE SOURCE FLG      UG/M3                %
 ----------------------------------------------------------------------------------
   1    RESWD   *  16.549+-13.424   47.471+-38.819
   4    TRANS   *   1.278+- 0.216    3.666+- 0.726
   5    RDOIL   *   0.033+- 0.017    0.094+- 0.049
   9    RDUST   *   1.009+- 0.133    2.894+- 0.485
  12    HOGFU   *   0.575+- 0.200    1.648+- 0.597
  14    ALUMP   *   0.050+- 0.092    0.132+- 0.263
  18    SECSO   *   2.655+- 0.444    7.616+- 1.499
  19    GALVN   *   0.032+- 0.011    0.092+- 0.034
 ----------------------------------------------------------------------------------
        TOTAL:     22.180+-13.435   63.624+-39.098

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ----------------------------------------------------------------------------------
   1  NA       *      0.095+- 0.014   0.272+- 0.049    0.097+- 0.019  1.028+-0.286  NA
   2  MG              0.029+- 0.010   0.084+- 0.031    0.043+- 0.015  1.473+-0.937  MG
   3  AL       *      0.131+- 0.017   0.376+- 0.063    0.131+- 0.010  0.998+-0.103  AL
   4  SI       *      0.283+- 0.033   0.812+- 0.126    0.290+- 0.020  1.026+-0.100  SI
   5  P               0.058+- 0.007   0.167+- 0.027    0.003+- 0.000  0.052+-0.006  P
   6  S        *      0.982+- 0.117   2.818+- 0.445    0.982+- 0.085  1.000+-0.123  S
   7  CL       *      0.287+- 0.037   0.825+- 0.136    0.191+- 0.109  0.664+-0.456  CL
   8  K        *      0.153+- 0.019   0.438+- 0.071    0.210+- 0.121  1.375+-1.347  K
   9  CA              0.114+- 0.014   0.328+- 0.053    0.052+- 0.025  0.455+-0.240  CA
  10  TI              0.008+- 0.002   0.022+- 0.006    0.009+- 0.005  1.118+-0.925  TI
  11  V        *      0.002+- 0.001   0.005+- 0.002    0.001+- 0.000  0.878+-0.259  V
  12  MN              0.005+- 0.001   0.014+- 0.004    0.004+- 0.001  0.718+-0.157  MN
  13  FE       *      0.097+- 0.012   0.278+- 0.046    0.080+- 0.023  0.824+-0.310  FE
  14  NI       *      0.002+- 0.001   0.005+- 0.003    0.002+- 0.000  1.148+-0.393  NI
  15  CU              0.013+- 0.002   0.039+- 0.008    0.000+- 0.000  0.028+-0.014  CU
  16  ZN       *      0.035+- 0.005   0.101+- 0.017    0.035+- 0.006  1.000+-0.257  ZN
  17  AS                    <  0.123         <  0.354  0.000+- 0.000  0.000+-0.000  AS
  18  BR       *      0.053+- 0.006   0.153+- 0.024    0.068+- 0.023  1.275+-0.702  BR
  19  SR                    <  0.031         <  0.088  0.000+- 0.000  0.000+-0.000  SR
  20  CD              0.016+- 0.009   0.046+- 0.027    0.001+- 0.001  0.033+-0.042  CD
  21  PB       *      0.184+- 0.022   0.528+- 0.083    0.178+- 0.026  0.965+-0.200  PB
  22  OC             -1.000+--1.000  -1.000+--1.000    8.447+- 2.287  0.965+-0.000  OC
  23  EC             -1.000+--1.000  -1.000+--1.000    2.477+- 1.396  0.965+-0.000  EC
 ----------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  34.9+- 3.6
```

```
CMBDEQ RESULTS FOR CMB # 010015
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 801217   SITE: SITE14   SITE CODE: 0000004
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.842 DEGREES OF FREEDOM:  3
 CODE SOURCE FLG      UG/M3                  %
 -----------------------------------------------------------------------------------------
   1   RESWD   *  14.987+-12.377   42.820+-35.639
   4   TRANS   *   1.818+- 0.303    5.196+- 1.019
   9   RDUST   *   0.547+- 0.083    1.562+- 0.287
  14   ALUMP   *   1.441+- 0.446    4.117+- 1.344
  18   SECSO   *   4.489+- 0.680   12.826+- 2.352
  19   GALVN   *   0.048+- 0.012    0.138+- 0.037
 -----------------------------------------------------------------------------------------
       TOTAL:     23.330+-12.408   66.658+-36.114

 SPECIE       FIT             FINE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS. UG/M3         PERCENT          CALC. UG/M3        RATIO
 -----------------------------------------------------------------------------------------
   1  NA              0.283+- 0.041   0.808+- 0.144     0.072+- 0.025  0.253+-0.093  NA
   2  MG                  <   0.462       <   1.320     0.077+- 0.031  0.000+-0.000  MG
   3  AL        *     0.391+- 0.046   1.116+- 0.174     0.455+- 0.115  1.165+-0.454  AL
   4  SI        *     0.165+- 0.020   0.470+- 0.074     0.169+- 0.012  1.024+-0.107  SI
   5  P               0.097+- 0.012   0.277+- 0.044     0.002+- 0.000  0.017+-0.002  P
   6  S         *     1.602+- 0.187   4.577+- 0.713     1.602+- 0.122  1.000+-0.108  S
   7  CL              0.768+- 0.091   2.194+- 0.344     0.139+- 0.079  0.181+-0.104  CL
   8  K         *     0.142+- 0.018   0.405+- 0.066     0.141+- 0.105  0.992+-1.043  K
   9  CA              0.024+- 0.004   0.070+- 0.015     0.040+- 0.030  1.650+-2.330  CA
  10  TI              0.004+- 0.001   0.013+- 0.004     0.009+- 0.007  1.959+-3.298  TI
  11  V         *     0.003+- 0.001   0.008+- 0.003     0.001+- 0.001  0.378+-0.208  V
  12  MN              0.010+- 0.002   0.030+- 0.006     0.001+- 0.000  0.140+-0.022  MN
  13  FE        *     0.122+- 0.015   0.349+- 0.057     0.069+- 0.033  0.565+-0.310  FE
  14  NI              0.001+- 0.001   0.003+- 0.003     0.003+- 0.001  2.541+-3.067  NI
  15  CU              0.037+- 0.005   0.106+- 0.018     0.001+- 0.000  0.020+-0.005  CU
  16  ZN        *     0.046+- 0.006   0.133+- 0.022     0.046+- 0.006  1.000+-0.186  ZN
  17  AS                  <   0.142       <   0.405     0.000+- 0.000  0.000+-0.000  AS
  18  BR        *     0.077+- 0.009   0.221+- 0.035     0.097+- 0.033  1.258+-0.685  BR
  19  SR                  <   0.032       <   0.092     0.000+- 0.000  0.000+-0.000  SR
  20  CD                  <   0.189       <   0.539     0.000+- 0.000  0.000+-0.000  CD
  21  PB        *     0.255+- 0.030   0.729+- 0.114     0.252+- 0.038  0.986+-0.207  PB
  22  OC             -1.000+--1.000  -1.000+--1.000     7.992+- 2.075  0.986+-0.000  OC
  23  EC             -1.000+--1.000  -1.000+--1.000     2.393+- 1.271  0.986+-0.000  EC
 -----------------------------------------------------------------------------------------
MEAS. AMB. MASS (UG/M3):  FINE:  35.0+- 3.6
```

```
CMBDEQ RESULTS FOR CMB # 010012
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 311    SITE: SITE14    SITE CODE: 0000004
SAMPLING DURATION: 24 HRS  WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.356 DEGREES OF FREEDOM:  7
 CODE SOURCE FLG      UG/M3                 %
 -------------------------------------------------------------------------------
   1   RESWD    *  19.121+-17.356   51.116+-46.694
   4   TRANS    *   2.109+- 0.354    5.639+- 1.111
   5   RDOIL    *   0.036+- 0.018    0.096+- 0.049
   9   RDUST    *   3.063+- 0.281    8.187+- 1.130
  12   HOGFU    *   1.051+- 0.328    2.810+- 0.923
  13   SECSO    *   2.131+- 0.490    5.696+- 1.435
  19   GALVN    *   0.059+- 0.015    0.158+- 0.044
 -------------------------------------------------------------------------------
       TOTAL:      27.570+-17.371   73.702+-47.055

 SPECIE      FIT             FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT         CALC. UG/M3        RATIO
 -------------------------------------------------------------------------------
   1   NA     *      0.167+- 0.024    0.445+- 0.079     0.164+- 0.033  0.986+-0.276   NA
   2   MG            0.062+- 0.015    0.165+- 0.043     0.089+- 0.021  1.442+-0.609   MG
   3   AL     *      0.349+- 0.041    0.933+- 0.146     0.346+- 0.024  0.991+-0.098   AL
   4   SI     *      0.867+- 0.098    2.318+- 0.354     0.870+- 0.059  1.003+-0.097   SI
   5   P             0.087+- 0.010    0.232+- 0.037     0.009+- 0.001  0.106+-0.011   P
   6   S      *      0.868+- 0.105    2.321+- 0.369     0.868+- 0.119  1.000+-0.194   S
   7   CL     *      0.162+- 0.023    0.434+- 0.077     0.287+- 0.160  1.769+-2.007   CL
   8   K      *      0.358+- 0.042    0.956+- 0.149     0.306+- 0.148  0.857+-0.545   K
   9   CA     *      0.106+- 0.013    0.284+- 0.046     0.094+- 0.041  0.883+-0.509   CA
  10   TI     *      0.014+- 0.002    0.037+- 0.008     0.020+- 0.008  1.474+-1.020   TI
  11   V      *      0.001+- 0.001    0.004+- 0.002     0.002+- 0.000  1.329+-0.478   V
  12   MN            0.006+- 0.001    0.016+- 0.004     0.009+- 0.001  1.578+-0.392   MN
  13   FE     *      0.219+- 0.026    0.587+- 0.092     0.205+- 0.039  0.934+-0.246   FE
  14   NI     *      0.003+- 0.001    0.008+- 0.003     0.002+- 0.001  0.774+-0.235   NI
  15   CU            0.009+- 0.002    0.025+- 0.006     0.001+- 0.000  0.094+-0.034   CU
  16   ZN     *      0.060+- 0.007    0.162+- 0.026     0.060+- 0.008  1.000+-0.182   ZN
  17   AS                 <  0.155         <  0.415     0.000+- 0.000  0.000+-0.000   AS
  18   BR     *      0.091+- 0.011    0.244+- 0.038     0.112+- 0.038  1.233+-0.664   BR
  19   SR                 <  0.031         <  0.082     0.000+- 0.000  0.000+-0.000   SR
  20   CD            0.026+- 0.010    0.071+- 0.027     0.002+- 0.002  0.061+-0.075   CD
  21   PB     *      0.317+- 0.037    0.847+- 0.131     0.295+- 0.044  0.930+-0.188   PB
  22   OC           -1.000+--1.000   -1.000+--1.000    10.048+- 2.645  0.930+-0.000   OC
  23   EC           -1.000+--1.000   -1.000+--1.000     3.044+- 1.620  0.930+-0.000   EC
 -------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:  37.4+- 3.9
```

```
CMBDEQ RESULTS FOR CMB # 010013
 FINE  PARTICULATE FRACTION
 SAMPLING DATE: 81 116   SITE: SITE15   SITE CODE: 0000005
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   2.958 DEGREES OF FREEDOM:  3
 CODE SOURCE FLG      UG/M3                  %
 ------------------------------------------------------------------------------------
  1    RESWD    *    5.553+- 3.804    70.146+-49.243
  4    TRANS    *    0.115+- 0.028     1.452+- 0.420
  9    RDUST    *    0.254+- 0.037     3.213+- 0.683
 14    ALUMP    *    0.085+- 0.044     1.076+- 0.586
 18    SECSO    *    2.305+- 0.310    29.116+- 5.952
 ------------------------------------------------------------------------------------
       TOTAL:        8.313+- 3.817  105.003+-50.847

 SPECIE      FIT              FINE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA              0.031+- 0.005   0.398+- 0.086    0.008+- 0.003  0.257+-0.096  NA
   2  MG              0.006+- 0.004   0.072+- 0.054    0.012+- 0.004  2.136+-1.834  MG
   3  AL       *      0.053+- 0.008   0.672+- 0.149    0.052+- 0.007  0.984+-0.189  AL
   4  SI       *      0.085+- 0.011   1.077+- 0.216    0.072+- 0.005  0.846+-0.076  SI
   5  P               0.036+- 0.005   0.451+- 0.093    0.001+- 0.000  0.021+-0.003  P
   6  S        *      0.777+- 0.093   9.820+- 1.918    0.777+- 0.041  1.000+-0.075  S
   7  CL                   <  0.129          <  1.632  0.032+- 0.028  0.000+-0.000  CL
   8  K        *      0.040+- 0.006   0.508+- 0.112    0.052+- 0.039  1.290+-1.579  K
   9  CA       *      0.009+- 0.002   0.117+- 0.036    0.007+- 0.004  0.792+-0.519  CA
  10  TI              0.001+- 0.001   0.016+- 0.013    0.002+- 0.000  1.175+-0.525  TI
  11  V                    <  0.010          <  0.130  0.000+- 0.000  0.000+-0.000  V
  12  MN                   <  0.017          <  0.219  0.001+- 0.000  0.000+-0.000  MN
  13  FE       *      0.009+- 0.003   0.109+- 0.041    0.016+- 0.002  1.853+-0.559  FE
  14  NI                   <  0.015          <  0.195  0.000+- 0.000  0.000+-0.000  NI
  15  CU              0.004+- 0.001   0.054+- 0.020    0.000+- 0.000  0.019+-0.015  CU
  16  ZN              0.013+- 0.002   0.163+- 0.037    0.002+- 0.002  0.174+-0.162  ZN
  17  AS              0.007+- 0.003   0.087+- 0.038    0.000+- 0.000  0.000+-0.009  AS
  18  BR       *      0.003+- 0.001   0.039+- 0.015    0.006+- 0.002  1.983+-1.492  BR
  19  SR                   <  0.027          <  0.341  0.000+- 0.000  0.000+-0.000  SR
  20  CD              0.010+- 0.008   0.124+- 0.103    0.000+- 0.000  0.014+-0.018  CD
  21  PB       *      0.023+- 0.004   0.293+- 0.073    0.016+- 0.002  0.696+-0.125  PB
  22  OC             -1.000+--1.000  -1.000+--1.000    2.693+- 0.766  0.696+-0.000  OC
  23  EC             -1.000+--1.000  -1.000+--1.000    0.741+- 0.467  0.696+-0.000  EC
 ------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  FINE:   7.9+- 1.2
```

```
CMBDEQ RESULTS FOR CMB # 010025
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 801209   SITE: SITE16   SITE CODE: 0000016 .
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.872 DEGREES OF FREEDOM: 11
 CODE SOURCE FLG      UG/M3              %
 ------------------------------------------------------------------------------
  1   RESWD   *  82.135+-22.963   85.809+-27.853
  4   TRANS   *   8.646+- 1.367    9.033+- 2.064
 10   RDUST   *  34.396+- 2.287   35.934+- 6.389
 11   MARIN   *   1.875+- 0.366    1.959+- 0.500
 18   SECSO   *   2.695+- 1.503    2.815+- 1.637
 ------------------------------------------------------------------------------
      TOTAL:    129.747+-23.169  135.551+-32.948

 SPECIE      FIT            INHALABLE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3          PERCENT         CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------
   1  NA      *     0.940+- 0.126   0.982+- 0.209    0.818+- 0.084  0.871+-0.119  NA
   2  MG      *     0.377+- 0.085   0.394+- 0.110    0.535+- 0.092  1.420+-0.425  MG
   3  AL      *     3.024+- 0.316   3.159+- 0.617    2.836+- 0.160  0.938+-0.073  AL
   4  SI      *    10.977+- 1.185  11.468+- 2.260   10.464+- 0.571  0.953+-0.072  SI
   5  P             0.188+- 0.017   0.196+- 0.037    0.084+- 0.007  0.446+-0.042  P
   6  S       *     1.620+- 0.168   1.692+- 0.330    1.620+- 0.462  1.000+-0.404  S
   7  CL      *     0.550+- 0.053   0.575+- 0.110    1.400+- 0.463  2.545+-2.303  CL
   8  K       *     1.064+- 0.099   1.111+- 0.210    1.334+- 0.576  1.254+-0.869  K
   9  CA      *     0.779+- 0.086   0.814+- 0.161    0.619+- 0.146  0.794+-0.238  CA
  10  TI      *     0.170+- 0.019   0.178+- 0.036    0.179+- 0.034  1.051+-0.289  TI
  11  V                   <  0.016         <  0.016  0.011+- 0.003  1.013+-0.324  V
  12  MN      *     0.031+- 0.004   0.032+- 0.007    0.033+- 0.003  1.076+-0.152  MN
  13  FE      *     1.233+- 0.133   1.288+- 0.254    1.331+- 0.169  1.080+-0.202  FE
  14  NI            0.006+- 0.002   0.006+- 0.002    0.000+- 0.001  0.000+-0.160  NI
  15  CU            0.029+- 0.004   0.030+- 0.006    0.002+- 0.002  0.083+-0.056  CU
  16  ZN      *     0.092+- 0.009   0.096+- 0.018    0.066+- 0.032  0.721+-0.424  ZN
  17  AS                  <  0.181         <  0.189  0.000+- 0.001  0.000+-0.056  AS
  18  BR      *     0.493+- 0.047   0.515+- 0.098    0.464+- 0.157  0.940+-0.435  BR
  19  SR            0.017+- 0.003   0.018+- 0.004    0.012+- 0.003  0.717+-0.186  SR
  20  CD                  <  0.307         <  0.321  0.023+- 0.014  0.000+-0.000  CD
  21  PB      *     1.294+- 0.118   1.352+- 0.255    1.264+- 0.179  0.977+-0.194  PB
  22  OC      *    55.490+- 9.240  57.972+-12.865   42.742+-11.359  0.770+-0.258  OC
  23  EC      *     7.680+- 1.590   8.024+- 2.124   12.772+- 6.950  1.663+-1.756  EC
 ------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  INHALABLE:  95.7+-15.8
```

```
CMBDED RESULTS FOR CMB # 010027
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 801212   SITE: SITE16   SITE CODE: 0000016
SAMPLING DURATION:  8 HRS. WITH START HOUR: 99
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    1.040 DEGREES OF FREEDOM: 11
 CODE SOURCE FLG      UG/M3                 %
 ---------------------------------------------------------------------------------------
  1    RESWD    * 123.256+-33.395  123.564+-55.834
  4    TRANS    *   6.524+- 1.071    6.540+- 2.597
 10    RDUST    *  30.797+- 2.058   30.874+-11.354
 11    MARIN    *   1.544+- 0.326    1.548+- 0.649
 18    SECSO    *  14.019+- 2.193   14.054+- 5.537
 ---------------------------------------------------------------------------------------
      TOTAL:     176.140+-33.549  176.580+-72.171

 SPECIE      FIT          INHALABLE  SUSPENDED PARTICULATE
 CODE        FLG      MEAS. UG/M3          PERCENT         CALC  UG/M3         RATIO
 ---------------------------------------------------------------------------------------
   1   NA     *      0.779+- 0.098   0.781+- 0.299    0.720+- 0.084   0.924+-0.147   NA
   2   MG     *      0.337+- 0.084   0.338+- 0.148    0.499+- 0.105   1.481+-0.558   MG
   3   AL     *      2.792+- 0.277   2.799+- 1.050    2.548+- 0.145   0.912+-0.070   AL
   4   SI     *      9.334+- 0.984   9.357+- 3.524    9.362+- 0.511   1.003+-0.078   SI
   5   P             0.348+- 0.034   0.349+- 0.131    0.075+- 0.007   0.215+-0.019   P
   6   S      *      5.319+- 0.544   5.332+- 2.004    5.319+- 0.472   1.000+-0.126   S
   7   CL     *      0.322+- 0.049   0.323+- 0.127    1.424+- 0.648   4.424+-9.133   CL
   8   K      *      0.838+- 0.080   0.840+- 0.314    1.620+- 0.864   1.932+-2.241   K
   9   CA     *      0.818+- 0.088   0.820+- 0.309    0.571+- 0.128   0.698+-0.191   CA
  10   TI     *      0.137+- 0.017   0.137+- 0.053    0.156+- 0.026   1.138+-0.288   TI
  11   V                   <  0.013        <  0.013   0.010+- 0.002   1.517+-0.675   V
  12   MN     *      0.029+- 0.005   0.029+- 0.012    0.030+- 0.003   1.030+-0.150   MN
  13   FE     *      1.059+- 0.115   1.062+- 0.401    1.170+- 0.132   1.104+-0.186   FE
  14   NI                  <  0.017        <  0.018   0.000+- 0.001   0.000+-0.346   NI
  15   CU            0.032+- 0.006   0.032+- 0.013    0.002+- 0.002   0.067+-0.055   CU
  16   ZN     *      0.095+- 0.011   0.096+- 0.036    0.076+- 0.046   0.800+-0.618   ZN
  17   AS                  <  0.188        <  0.189   0.000+- 0.001   0.000+-0.000   AS
  18   BR     *      0.310+- 0.031   0.310+- 0.117    0.350+- 0.118   1.131+-0.576   BR
  19   SR                  <  0.026        <  0.027   0.011+- 0.002   1.100+-0.377   SR
  20   CD                  <  0.301        <  0.302   0.021+- 0.012   0.000+-0.000   CD
  21   PB     *      1.022+- 0.102   1.024+- 0.384    0.963+- 0.135   0.943+-0.182   PB
  22   OC     *     84.440+-12.000  84.651+-32.891   61.360+-17.018   0.727+-0.249   OC
  23   EC     *      9.680+- 2.020   9.704+- 4.052   17.481+-10.373   1.806+-2.212   EC
 ---------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  INHALABLE:  99.8+-36.1
```

```
CMBDED RESULTS FOR CMB # 010047
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 81 108   SITE: SITE16   SITE CODE: 0000016
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.704 DEGREES OF FREEDOM: 11
 CODE SOURCE FLG      UG/M3                 %
-------------------------------------------------------------------------------------
  1    RESWD    *   78.915+-20.982    55.350+-15.879
  4    TRANS    *    4.536+- 0.715     3.181+- 0.607
  5    RDOIL    *    0.075+- 0.035     0.052+- 0.025
 10    RDUST    *   17.477+- 1.199    12.258+- 1.565
 11    MARIN    *    0.850+- 0.191     0.596+- 0.149
 18    SECSO    *    2.691+- 0.954     1.888+- 0.699
-------------------------------------------------------------------------------------
       TOTAL:      104.543+-21.051    73.325+-16.745

SPECIE      FIT             INHALABLE  SUSPENDED PARTICULATE
CODE        FLG      MEAS. UG/M3          PERCENT          CALC. UG/M3         RATIO
-------------------------------------------------------------------------------------
  1   NA     *      0.425+- 0.056    0.298+- 0.051    0.408+- 0.050   0.960+-0.162   NA
  2   MG     *      0.247+- 0.049    0.174+- 0.039    0.295+- 0.068   1.194+-0.429   MG
  3   AL     *      1.596+- 0.163    1.119+- 0.166    1.449+- 0.083   0.908+-0.070   AL
  4   SI     *      5.690+- 0.612    3.991+- 0.607    5.318+- 0.290   0.935+-0.070   SI
  5   P             0.176+- 0.016    0.124+- 0.017    0.042+- 0.004   0.241+-0.022   P
  6   S      *      1.339+- 0.139    0.939+- 0.141    1.339+- 0.279   1.000+-0.294   S
  7   CL     *      0.454+- 0.052    0.318+- 0.050    0.863+- 0.412   1.901+-1.951   CL
  8   K      *      0.594+- 0.056    0.417+- 0.060    0.996+- 0.553   1.677+-1.816   K
  9   CA     *      0.463+- 0.050    0.325+- 0.050    0.341+- 0.086   0.736+-0.231   CA
 10   TI     *      0.096+- 0.011    0.067+- 0.011    0.091+- 0.018   0.950+-0.254   TI
 11   V                   <  0.012          <  0.009    0.008+- 0.002   2.137+-0.944   V
 12   MN     *      0.013+- 0.002    0.009+- 0.002    0.017+- 0.002   1.277+-0.215   MN
 13   FE     *      0.612+- 0.066    0.429+- 0.065    0.681+- 0.088   1.114+-0.216   FE
 14   NI     *      0.004+- 0.001    0.003+- 0.001    0.004+- 0.001   1.000+-0.429   NI
 15   CU            0.017+- 0.002    0.012+- 0.002    0.001+- 0.001   0.074+-0.061   CU
 16   ZN     *      0.064+- 0.006    0.045+- 0.006    0.048+- 0.030   0.742+-0.572   ZN
 17   AS                  <  0.263          <  0.184    0.000+- 0.001   0.000+-0.000   AS
 18   BR     *      0.260+- 0.025    0.182+- 0.026    0.243+- 0.082   0.934+-0.432   BR
 19   SR                  <  0.031          <  0.022    0.006+- 0.001   0.711+-0.208   SR
 20   CD                  <  0.144          <  0.101    0.012+- 0.007   0.687+-0.493   CD
 21   PB     *      0.652+- 0.060    0.458+- 0.065    0.662+- 0.094   1.014+-0.205   PB
 22   OC     *     46.780+- 6.910   32.811+- 5.999   39.448+-10.897   0.843+-0.305   OC
 23   EC     *      7.710+- 1.600    5.408+- 1.264   11.286+- 6.643   1.464+-1.527   EC
-------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  INHALABLE: 142.6+-15.4
```

```
CMBDEQ RESULTS FOR CMB # 010053
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 81 118   SITE: SITE16   SITE CODE: 0000016
SAMPLING DURATION: 24 HRS  WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING   REDUCED CHI SQUARE:    0.655 DEGREES OF FREEDOM: 12
 CODE SOURCE FLG      UG/M3                  %
 ------------------------------------------------------------------------------------
  1    RESWD   * 126.158+-29.405   99.547+-25.852
  4    TRANS   *   2.629+- 0.410    2.074+- 0.402
 10    RDUST   *   4.855+- 0.417    3.831+- 0.549
 12    SECSO   *   3.067+- 0.968    2.420+- 0.813
 ------------------------------------------------------------------------------------
       TOTAL:     136.708+-29.427  107.871+-26.301

 SPECIE       FIT              INHALABLE  SUSPENDED PARTICULATE
 CODE         FLG      MEAS. UG/M3        PERCENT         CALC. UG/M3         RATIO
 ------------------------------------------------------------------------------------
   1   NA      *      0.147+- 0.017   0.116+- 0.019     0.105+- 0.058  0.710+-0.483  NA
   2   MG      *            < 0.163         < 0.129     0.159+- 0.094  2.608+-4.327  MG
   3   AL      *      0.492+- 0.050   0.388+- 0.059     0.426+- 0.034  0.867+-0.091  AL
   4   SI      *      1.419+- 0.151   1.120+- 0.175     1.485+- 0.081  1.047+-0.082  SI
   5   P              0.140+- 0.012   0.111+- 0.016     0.012+- 0.002  0.084+-0.012  P
   6   S       *      1.370+- 0.125   1.081+- 0.158     1.370+- 0.289  1.000+-0.298  S
   7   CL      *      0.316+- 0.036   0.250+- 0.041     0.708+- 0.642  2.238+-4.979  CL
   8   K       *      0.231+- 0.021   0.182+- 0.027     1.170+- 0.883  5.073+-$19.8  K
   9   CA      *      0.151+- 0.016   0.119+- 0.019     0.177+- 0.086  1.172+-0.879  CA
  10   TI      *      0.022+- 0.003   0.018+- 0.003     0.030+- 0.010  1.321+-0.731  TI
  11   V                    < 0.016         < 0.013     0.002+- 0.001  1.335+-1.317  V
  12   MN      *      0.006+- 0.001   0.005+- 0.001     0.005+- 0.001  0.724+-0.254  MN
  13   FE      *      0.150+- 0.017   0.118+- 0.019     0.214+- 0.048  1.426+-0.557  FE
  14   NI                   < 0.022         < 0.017     0.000+- 0.001  0.000+-1.579  NI
  15   CU             0.009+- 0.002   0.007+- 0.002     0.000+- 0.001  0.038+-0.142  CU
  16   ZN      *      0.024+- 0.003   0.019+- 0.003     0.053+- 0.047  2.217+-4.756  ZN
  17   AS                   < 0.199         < 0.157     0.000+- 0.001  0.000+-0.000  AS
  18   BR      *      0.166+- 0.016   0.131+- 0.019     0.140+- 0.048  0.843+-0.375  BR
  19   SR                   < 0.033         < 0.026     0.002+- 0.001  0.629+-0.572  SR
  20   CD                   < 0.292         < 0.230     0.003+- 0.002  0.000+-0.000  CD
  21   PB      *      0.379+- 0.034   0.299+- 0.044     0.373+- 0.054  0.984+-0.202  PB
  22   OC      *     75.450+-11.000  59.535+-11.037    61.059+-17.411  0.809+-0.297  OC
  23   EC      *     12.300+- 2.540   9.705+- 2.292    16.835+-10.600  1.369+-1.461  EC
 ------------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  INHALABLE: 126.7+-14.5
```

```
                                                PAGE 0065

CMBDEB RESULTS FOR CMB # 010055
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 81 120    SITE: SITE16    SITE CODE: 0000016
SAMPLING DURATION: 24 HRS  WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:    0.704 DEGREES OF FREEDOM: 11
 CODE SOURCE FLG      UG/M3                    %
 ------------------------------------------------------------------------------------
  1    RESWD    * 105.491+-28.659    44.282+-12.814
  4    TRANS    *   4.864+- 0.760     2.042+- 0.378
 10    RDUST    *  11.477+- 0.873     4.818+- 0.604
 11    MARIN    *   0.591+- 0.178     0.248+- 0.079
 18    SECSD    *   6.145+- 1.231     2.580+- 0.577
 ------------------------------------------------------------------------------------
       TOTAL:     128.568+-28.709    53.969+-13.196

 SPECIE      FIT              INHALABLE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3          PERCENT          CALC  UG/M3         RATIO
 ------------------------------------------------------------------------------------
   1   NA     *      0.334+- 0.039    0.140+- 0.022     0.324+- 0.054  0.970+-0.225  NA
   2   MG     *      0.171+- 0.032    0.072+- 0.015     0.251+- 0.086  1.469+-0.890  MG
   3   AL     *      1.073+- 0.106    0.451+- 0.063     0.965+- 0.058  0.899+-0.072  AL
   4   SI     *      3.452+- 0.359    1.449+- 0.209     3.503+- 0.191  1.015+-0.079  SI
   5   P             0.191+- 0.017    0.080+- 0.011     0.028+- 0.003  0.146+-0.014  P
   6   S      *      2.490+- 0.220    1.045+- 0.139     2.490+- 0.337  1.000+-0.191  S
   7   CL     *      0.511+- 0.055    0.214+- 0.032     0.897+- 0.542  1.757+-2.144  CL
   8   K      *      0.469+- 0.042    0.197+- 0.026     1.116+- 0.739  2.379+-4.062  K
   9   CA     *      0.376+- 0.041    0.158+- 0.023     0.281+- 0.099  0.749+-0.329  CA
  10   TI     *      0.050+- 0.006    0.021+- 0.003     0.066+- 0.018  1.311+-0.603  TI
  11   V                   <  0.017         <  0.007    0.004+- 0.001  1.457+-0.903  V
  12   MN     *      0.011+- 0.002    0.005+- 0.001     0.011+- 0.001  0.994+-0.186  MN
  13   FE     *      0.383+- 0.041    0.161+- 0.023     0.481+- 0.090  1.256+-0.377  FE
  14   NI                  <  0.030         <  0.012    0.000+- 0.001  0.000+-0.000  NI
  15   CU            0.014+- 0.003    0.006+- 0.001     0.001+- 0.001  0.058+-0.084  CU
  16   ZN     *      0.060+- 0.006    0.025+- 0.004     0.053+- 0.039  0.876+-0.867  ZN
  17   AS                  <  0.238         <  0.100    0.000+- 0.001  0.000+-0.000  AS
  18   BR     *      0.301+- 0.027    0.126+- 0.017     0.260+- 0.088  0.865+-0.387  BR
  19   SR            0.009+- 0.003    0.004+- 0.001     0.004+- 0.001  0.446+-0.162  SR
  20   CD                  <  0.321         <  0.135    0.008+- 0.005  0.000+-0.000  CD
  21   PB     *      0.698+- 0.064    0.293+- 0.040     0.695+- 0.101  0.995+-0.203  PB
  22   OC     *     49.610+- 9.950   20.825+- 4.664    52.205+-14.564  1.052+-0.426  OC
  23   EC     *     31.020+- 6.400   13.021+- 2.983    14.773+- 8.874  0.476+-0.317  EC
 ------------------------------------------------------------------------------------
MEAS  AMB. MASS (UG/M3):  INHALABLE: 238.2+-23.7
```

```
CMBDEQ RESULTS FOR CMB # 010075
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 81 207   SITE: SITE16   SITE CODE: 0000016
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   1.049 DEGREES OF FREEDOM: 11
 CODE SOURCE FLG      UG/M3                %
 ------------------------------------------------------------------------------
  1   RESWD   *  64.719+-17.568   81.921+-26.018
  4   TRANS   *   2.566+- 0.412    3.248+- 0.748
  5   RDOIL   *   0.066+- 0.031    0.083+- 0.042
 10   RDUST   *  17.448+- 1.110   22.085+- 3.903
 11   MARIN   *   1.194+- 0.224    1.511+- 0.378
 18   SECSO   *   1.987+- 0.649    2.515+- 0.921
 ------------------------------------------------------------------------------
      TOTAL:     87.979+-17.622  111.363+-28.889

 SPECIE      FIT            INHALABLE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------
   1  NA      *      0.577+- 0.071    0.731+- 0.150     0.534+- 0.056  0.924+-0.133  NA
   2  MG      *      0.184+- 0.158    0.233+- 0.204     0.284+- 0.053  1.547+-0.535  MG
   3  AL      *      1.550+- 0.162    1.962+- 0.383     1.441+- 0.082  0.930+-0.072  AL
   4  SI      *      5.450+- 0.581    6.898+- 1.354     5.298+- 0.290  0.972+-0.074  SI
   5  P              0.115+- 0.011    0.145+- 0.027     0.042+- 0.004  0.370+-0.035  P
   6  S       *      1.014+- 0.101    1.283+- 0.247     1.014+- 0.186  1.000+-0.259  S
   7  CL      *      0.199+- 0.023    0.252+- 0.051     0.882+- 0.351  4.428+-8.004  CL
   8  K       *      0.551+- 0.051    0.698+- 0.132     0.878+- 0.454  1.594+-1.549  K
   9  CA      *      0.451+- 0.049    0.571+- 0.113     0.312+- 0.057  0.692+-0.155  CA
  10  TI      *      0.081+- 0.010    0.103+- 0.021     0.085+- 0.011  1.045+-0.137  TI
  11  V                    <  0.014          <  0.018   0.008+- 0.001  1.179+-0.334  V
  12  MN      *      0.014+- 0.002    0.018+- 0.004     0.017+- 0.002  1.220+-0.193  MN
  13  FE      *      0.611+- 0.065    0.773+- 0.152     0.644+- 0.058  1.054+-0.137  FE
  14  NI      *      0.003+- 0.001    0.004+- 0.002     0.004+- 0.001  1.005+-0.421  NI
  15  CU             0.003+- 0.002    0.003+- 0.002     0.001+- 0.001  0.471+-0.390  CU
  16  ZN      *      0.047+- 0.005    0.060+- 0.012     0.041+- 0.024  0.863+-0.676  ZN
  17  AS                   <  0.114          <  0.144   0.000+- 0.001  0.000+-0.046  AS
  18  BR      *      0.146+- 0.015    0.185+- 0.036     0.139+- 0.046  0.949+-0.437  BR
  19  SR                   <  0.033          <  0.041   0.006+- 0.001  0.664+-0.180  SR
  20  CD                   <  0.270          <  0.342   0.012+- 0.007  0.000+-0.000  CD
  21  PB      *      0.385+- 0.035    0.487+- 0.092     0.390+- 0.053  1.013+-0.137  PB
  22  OC      *     41.100+- 6.130   52.024+-11.566    31.855+- 8.934  0.775+-0.275  OC
  23  EC      *      4.840+- 1.000    6.126+- 1.619     8.954+- 5.442  1.850+-2.365  EC
 ------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  INHALABLE:  79.0+-13.0
```

```
CMBDEQ RESULTS FOR CMB # 010073
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 81 211   SITE: SITE16   SITE CODE: 0000016
SAMPLING DURATION: 24 HRS  WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.805 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG      UG/M3                %
 ------------------------------------------------------------------------------------
  1   RESWD   *  52.166+-13.909  114.053+-43.044
  4   TRANS   *   0.716+- 0.125    1.566+- 0.500
 10   RDUST   *  10.788+- 0.675   23.588+- 6.471
 11   MARIN   *   0.540+- 0.118    1.180+- 0.407
 18   SECSO   *   1.124+- 0.399    2.458+- 1.092
 ------------------------------------------------------------------------------------
      TOTAL:     65.334+-13.932  142.844+-48.822

 SPECIE      FIT           INHALABLE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3          PERCENT          CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------------
   1  NA      *      0.257+- 0.032    0.563+- 0.166     0.259+- 0.032  1.007+-0.178  NA
   2  MG      *      0.160+- 0.029    0.349+- 0.113     0.168+- 0.039  1.050+-0.358  MG
   3  AL      *      0.846+- 0.088    1.850+- 0.530     0.892+- 0.051  1.054+-0.088  AL
   4  SI      *      3.253+- 0.342    7.112+- 2.042     3.270+- 0.179  1.005+-0.078  SI
   5  P              0.058+- 0.006    0.127+- 0.037     0.026+- 0.002  0.452+-0.044  P
   6  S       *      0.568+- 0.064    1.243+- 0.360     0.568+- 0.112  1.000+-0.280  S
   7  CL             0.061+- 0.012    0.133+- 0.044     0.507+- 0.271  8.355+-137.5  CL
   8  K       *      0.293+- 0.028    0.641+- 0.182     0.645+- 0.365  2.200+-3.012  K
   9  CA      *      0.267+- 0.029    0.584+- 0.168     0.188+- 0.034  0.703+-0.157  CA
  10  TI      *      0.058+- 0.007    0.127+- 0.037     0.050+- 0.004  0.856+-0.099  TI
  11  V              0.004+- 0.001    0.009+- 0.004     0.004+- 0.001  0.848+-0.287  V
  12  MN                 <  0.021          <  0.047     0.010+- 0.001  1.539+-0.298  MN
  13  FE      *      0.347+- 0.037    0.760+- 0.219     0.381+- 0.025  1.096+-0.107  FE
  14  NI                 <  0.024          <  0.054     0.000+- 0.001  0.000+-0.000  NI
  15  CU                 <  0.028          <  0.060     0.001+- 0.001  0.145+-0.132  CU
  16  ZN      *      0.019+- 0.002    0.041+- 0.012     0.029+- 0.019  1.542+-1.911  ZN
  17  AS                 <  0.076          <  0.167     0.000+- 0.001  0.000+-0.000  AS
  18  BR      *      0.036+- 0.004    0.079+- 0.023     0.039+- 0.013  1.082+-0.528  BR
  19  SR                 <  0.033          <  0.072     0.004+- 0.001  0.787+-0.243  SR
  20  CD                 <  0.205          <  0.448     0.007+- 0.004  0.686+-0.493  CD
  21  PB      *      0.122+- 0.013    0.267+- 0.077     0.121+- 0.015  0.991+-0.173  PB
  22  OC      *     30.430+- 4.570   66.531+-20.387    25.088+- 7.199  0.824+-0.307  OC
  23  EC      *      3.250+- 0.680    7.106+- 2.411     6.864+- 4.382  2.112+-3.151  EC
 ------------------------------------------------------------------------------------
MEAS  AMB. MASS (UG/M3):  INHALABLE:  45.7+-12.2
```

```
CMBDEQ RESULTS FOR CMB # 010077
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 81 213   SITE: SITE16   SITE CODE: 0000016
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.779 DEGREES OF FREEDOM: 10
 CODE SOURCE FLG     UG/M3                 %
 ------------------------------------------------------------------------------
  1    RESWD   *  50.002+-13.440   66.808+-21.453
  4    TRANS   *   2.287+- 0.371    3.055+- 0.730
 10    RDUST   *  12.213+- 0.829   16.318+- 3.073
 11    MARIN   *   0.925+- 0.174    1.236+- 0.318
 18    SECSO   *   1.587+- 0.539    2.120+- 0.811
 ------------------------------------------------------------------------------
      TOTAL:      67.013+-13.482   89.538+-23.915

 SPECIE      FIT           INHALABLE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3         PERCENT         CALC. UG/M3        RATIO
 ------------------------------------------------------------------------------
   1  NA       *      0.443+- 0.056   0.592+- 0.128    0.412+- 0.044  0.928+-0.134  NA
   2  MG       *      0.140+- 0.032   0.187+- 0.054    0.211+- 0.042  1.511+-0.544  MG
   3  AL       *      1.028+- 0.107   1.374+- 0.280    1.010+- 0.057  0.983+-0.078  AL
   4  SI       *      3.668+- 0.391   4.901+- 1.007    3.711+- 0.203  1.012+-0.079  SI
   5  P               0.108+- 0.010   0.144+- 0.029    0.030+- 0.003  0.275+-0.025  P
   6  S        *      0.799+- 0.084   1.067+- 0.219    0.799+- 0.154  1.000+-0.273  S
   7  CL       *      0.393+- 0.038   0.525+- 0.105    0.688+- 0.271  1.754+-1.396  CL
   8  K        *      0.411+- 0.037   0.549+- 0.108    0.656+- 0.350  1.597+-1.606  K
   9  CA       *      0.338+- 0.037   0.452+- 0.094    0.228+- 0.048  0.674+-0.169  CA
  10  TI                    <  0.231         <  0.309    0.061+- 0.009  1.106+-0.253  TI
  11  V                     <  0.082         <  0.110    0.004+- 0.001  0.960+-0.327  V
  12  MN       *      0.012+- 0.002   0.016+- 0.004    0.012+- 0.001  1.004+-0.145  MN
  13  FE       *      0.439+- 0.047   0.587+- 0.121    0.458+- 0.048  1.043+-0.157  FE
  14  NI                    <  0.010         <  0.014    0.000+- 0.001  0.000+-0.469  NI
  15  CU              0.016+- 0.002   0.022+- 0.005    0.001+- 0.001  0.053+-0.044  CU
  16  ZN       *      0.035+- 0.004   0.047+- 0.010    0.030+- 0.019  0.873+-0.709  ZN
  17  AS                    <  0.184         <  0.246    0.000+- 0.001  0.000+-0.000  AS
  18  BR       *      0.127+- 0.013   0.169+- 0.034    0.123+- 0.041  0.974+-0.456  BR
  19  SR                    <  0.024         <  0.032    0.004+- 0.001  0.994+-0.325  SR
  20  CD                    <  0.132         <  0.176    0.008+- 0.005  1.025+-0.868  CD
  21  PB       *      0.339+- 0.033   0.453+- 0.091    0.341+- 0.047  1.005+-0.198  PB
  22  OC       *     30.310+- 4.580  40.498+- 9.384   24.737+- 6.903  0.816+-0.294  OC
  23  EC       *      5.330+- 1.100   7.121+- 1.930    6.998+- 4.206  1.313+-1.302  EC
 ------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  INHALABLE:  74.8+-13.1
```

```
CMBDEQ RESULTS FOR CMB # 010081
 INHALABLE  PARTICULATE FRACTION
 SAMPLING DATE: 81 223   SITE: SITE16   SITE CODE: 0000016
SAMPLING DURATION: 24 HRS. WITH START HOUR:  0
BACKGROUND SITE SUBTRACTED: NO
 EFFECTIVE VARIANCE FITTING.  REDUCED CHI SQUARE:   0.584 DEGREES OF FREEDOM:  9
 CODE SOURCE FLG     UG/M3                %
 ---------------------------------------------------------------------------------
  1    RESWD    *  77.945+-21.128  156.214+-57.204
  4    TRANS    *   2.574+- 0.417    5.159+- 1.521
 10    RDUST    *  22.328+- 1.447   44.748+-11.393
 11    MARIN    *   1.158+- 0.231    2.320+- 0.736
 18    SECSO    *   0.627+- 0.656    0.675+- 1.351
 ---------------------------------------------------------------------------------
       TOTAL:     104.631+-21.193  209.698+-66.856

 SPECIE      FIT          INHALABLE  SUSPENDED PARTICULATE
 CODE        FLG     MEAS. UG/M3         PERCENT        CALC. UG/M3       RATIO
 --------------------------------------------------------------------------------
   1  NA       *     0.527+- 0.070   1.055+- 0.295    0.528+- 0.059  1.002+-0.157  NA
   2  MG       *     0.278+- 0.142   0.556+- 0.316    0.336+- 0.063  1.212+-0.355  MG
   3  AL       *     1.967+- 0.201   3.943+- 1.051    1.842+- 0.105  0.936+-0.073  AL
   4  SI       *     6.943+- 0.751  13.915+- 3.742    6.774+- 0.371  0.976+-0.075  SI
   5  P              0.129+- 0.012   0.260+- 0.068    0.054+- 0.005  0.419+-0.040  P
   6  S        *     0.605+- 0.063   1.212+- 0.324    0.605+- 0.203  1.000+-0.475  S
   7  CL             0.137+- 0.017   0.275+- 0.076    0.939+- 0.414  6.848+-$20.8  CL
   8  K      . *     0.557+- 0.056   1.116+- 0.297    1.077+- 0.546  1.934+-2.137  K
   9  CA       *     0.479+- 0.052   0.960+- 0.259    0.382+- 0.064  0.796+-0.171  CA
  10  TI                   < 0.231         < 0.467    0.106+- 0.012  0.856+-0.127  TI
  11  V                    < 0.082         < 0.165    0.007+- 0.002  1.068+-0.370  V
  12  MN       *     0.018+- 0.002   0.035+- 0.010    0.022+- 0.002  1.224+-0.192  MN
  13  FE       *     0.803+- 0.087   1.609+- 0.433    0.808+- 0.064  1.007+-0.113  FE
  14  NI                   < 0.013         < 0.026    0.000+- 0.001  0.000+-0.369  NI
  15  CU             0.022+- 0.003   0.043+- 0.012    0.002+- 0.001  0.072+-0.055  CU
  16  ZN       *     0.052+- 0.005   0.104+- 0.028    0.049+- 0.029  0.951+-0.772  ZN
  17  AS                   < 0.162         < 0.324    0.000+- 0.001  0.000+-0.135  AS
  18  BR       *     0.137+- 0.013   0.275+- 0.073    0.139+- 0.047  1.014+-0.483  BR
  19  SR                   < 0.024         < 0.049    0.008+- 0.002  0.704+-0.192  SR
  20  CD                   < 0.172         < 0.344    0.015+- 0.009  0.000+-0.000  CD
  21  PB       *     0.398+- 0.037   0.798+- 0.210    0.401+- 0.054  1.007+-0.191  PB
  22  OC       *    45.100+- 6.680  90.388+-25.971   38.134+-10.759  0.846+-0.312  OC
  23  EC       *     5.540+- 1.150  11.103+- 3.576   10.649+- 6.552  1.922+-2.563  EC
 ---------------------------------------------------------------------------------
MEAS  AMB  MASS (UG/M3):  INHALABLE:  49.9+-12.3
```

Appendix 6

Quality Assurance Program

Sampling and Analysis
Standard Operating Procedures

1. Energy Dispersive X-Ray Fluorescence Analysis
2. Organic and Elemental Carbon Analysis
3. Teflon Filter Weighing Procedures
4. Hi-vol Sampler Calibration Procedure
5. Hi-vol Filter Handling and Storage
6. Dichotomous Sampler Maintenance
7. Hi-vol Filter Weighing Procedure
8. Hi-vol Sampler Maintenance
9. Hi-vol Sampler Audit Procedure
10. Dichotomous Filter Handling and Data Procedures
11. Soil and Road Dust Sampling Procedures

STANDARD OPERATING PROCEDURE

ENERGY DISPERSIVE X-RAY FLUORESCENCE ANALYSIS OF AIR FILTERS

1. General Discussion
   1. Analytical problem: Analysis of aerosols deposited on membrane type filters for the elements listed in Table 1. Typical atmospheric concentrations and ranges are indicated in Figure 1.
   2. Principle: Atoms in the sample are excited from their ground state to higher energy levels by x-radiation from an X-ray tube. These excited atoms emit discrete energy X-rays as they return to their normal ground state energy level. The energy of these emitted X-rays is characteristic of the emitting element and is used to qualitatively identify the element while the number of observed X-rays, which is proportional to the number of atoms, is used to quantitatively determine a specific element's concentration through a direct comparison with standards.
   3. Interferences: There are a number of potential spectral interferences possible with EDXRF because of its low resolution relative to the number and spacing of possible X-ray lines. The elements subject to potential spectral interferences in normal ambient aerosols, along with the corresponding interfering elements and correction factors are listed in Table 2. Correction factors, F_{im}, are determined by analyzing single element standards of elements i and applying the formulas

$$F_{im} = \frac{N_m}{N_i}$$

where F_{im} = the fraction of counts due to element i that interfere with the counts for element m

N_m = background subtracted counts in region of interest m

N_i = background subtracted counts in region of interest i

(Rev. August, 1981)

Table 1

X-RAY FLUORESCENCE
MINIMUM DETECTABLE CONCENTRATIONS*
(ng/cm^2)
STANDARD ANALYSES+

Element	1	2	3	4	5**
Al	42	30	30	18	10
Si	35	24	18	12	8
P	45	30	23	15	10
S	140	90	70	47	30
Cl	90	60	45	32	20
K	30	20	15	11	6
Ca	30	20	15	11	6
Ti	10	6	5	3	2
V	6	4	3	2	1
Cr	6	4	3	2	1
Mn	9	6	5	3	1
Fe	12	8	6	4	2
Ni	10	6	5	3	1
Cu	10	6	5	3	1
Zn	10	6	5	3	1
Ga	8	6	4	3	1
As	8	6	4	3	1
Se	8	6	4	3	1
Br	12	8	6	4	2
Rb	20	14	10	7	4
Sr	20	16	10	8	4
Y	40	30	22	15	8
Zr	160	120	84	60	30
Pd	45	30	22	15	8
Ag	70	48	34	24	12
Cd	70	50	36	25	14
In	90	60	44	30	15
Sn	90	60	44	30	15
Sb	90	60	44	30	15
Ba	500	360	260	180	100
La	500	360	260	180	100
Hg	20	16	11	8	4
Pb	25	20	14	10	5

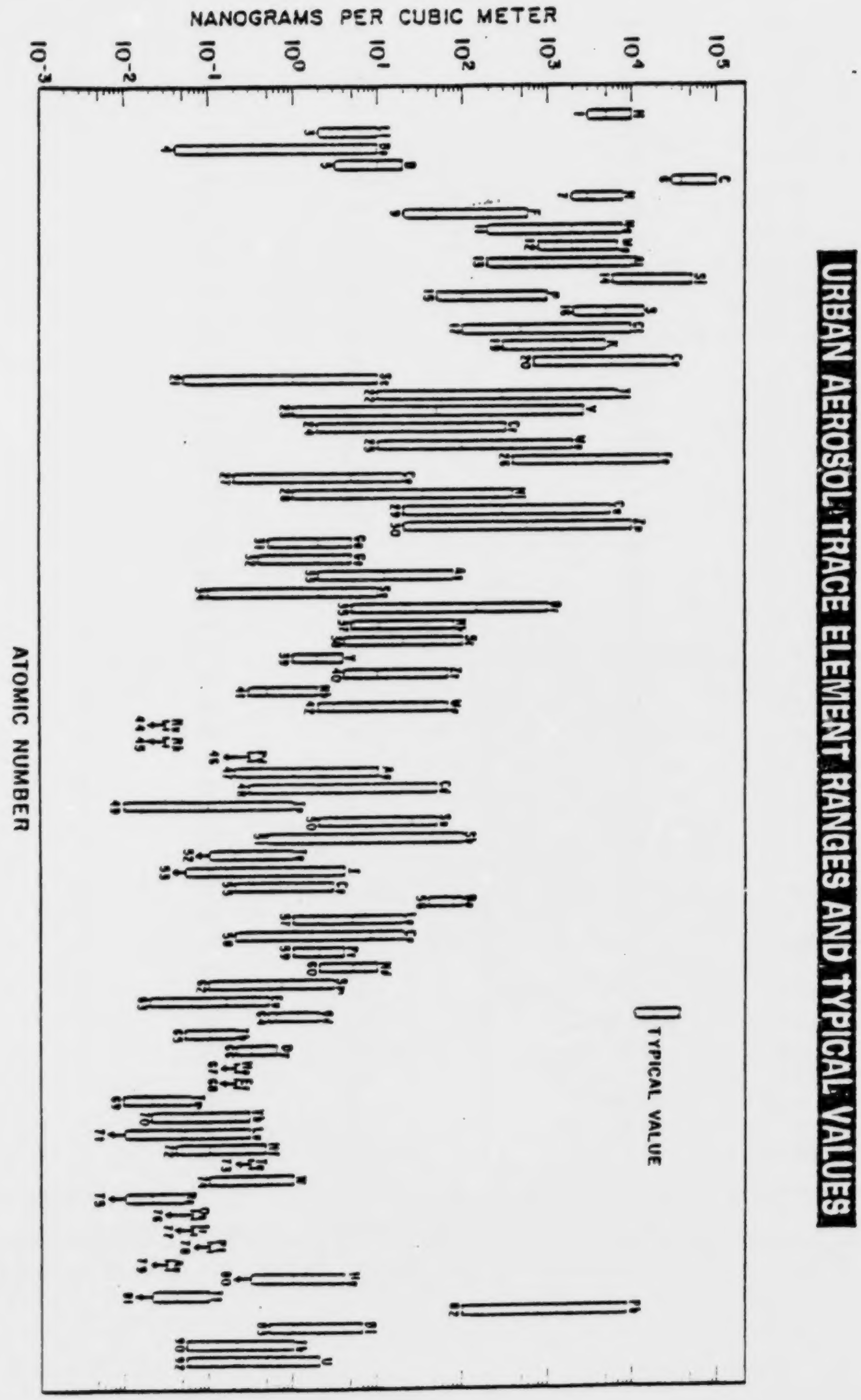
* Three sigma interference-free MDC for particulates deposited on filters with 1 mg/cm^2 densities such as Nuclepore and some cellulose and teflon filters MDC $\propto$ (time)$^{-1/2}$ (filter density)$^{1/2}$

** For stretched teflon filters

+ Custom analysis for specific elements at special MDC's available upon request.

(Rev. August, 1981)

Figure 1



(Rev. August, 1981)

Table 2

Potential Spectral Interferences

Element of Interest			Element of Interest			F_{im}
Element	Excitation Condition	Line	Element	Excitation Condition	Line	
Mg	2	Kα	Br	1	Lα	0.0098 ± 0.0003
Al	2	Kα	Br	1	Lα	0.176 ± 0.001
Al	2	Kα	K	2	escape	0.0047 ± 0.0005
Si	2	Kα	Br	1	Lα	0.0028 ± 0.0003
Si	2	Kα	Sr	1	Lα	0.285 ± 0.002
P	2	Kα	Ca	2	escape	0.0137 ± 0.0009
K	2	Kα	Ca	2	Kα	0.0121 ± 0.0008
K	2	Kα	Cd	1	Lβ	1.116 ± 0.006
Ca	2	Kα	K	2	Kβ	0.0309 ± 0.0008
S	3	Kα	Pb	3	M	0.19 ± 0.02
Cl	3	Kα	S	3	Kα	0.026 ± 0.005
Cl	3	Kα	Pb	3	M	0.073 ± 0.002
K	3	Kα	Cd	1	Lβ	0.401 ± 0.003
Ca	3	Kα	K	3	Kβ	0.070 ± 0.002
Ti	3	Kα	Ba	1	Lα	4.52 ± 0.04
V	3	Kα	Ba	1	Lβ	2.38 ± 0.02
V	3	Kα	Ti	3	Kβ	0.127 ± 0.002
Cr	3	Kα	V	3	Kβ	0.132 ± 0.002
Mn	3	Kα	Cr	3	Kβ	0.130 ± 0.001
Fe	3	Kα	Mn	3	Kβ	0.116 ± 0.001
As	3	Kα	Pb	3	Lα	1.11 ± 0.01
Br	3	Kα	Pb	3	Lβ	0.014 ± 0.001
Cu	1	Kα	Ni	1	Kβ	0.065 ± 0.002
Zn	1	Kα	Cu	1	Kβ	0.0376 ± 0.0006
Ga	1	Kα	Zn	1	Kβ	0.0149 ± 0.0004
Ga	1	Kα	Pb	1	Lα	0.060 ± 0.001
Hg	1	Lα	Pb	1	Lα	0.0033 ± 0.0002
Hg	1	Lα	Br	1	Kα	0.00063± 0.00006
As	1	Kα	Pb	1	Lα	1.196 ± 0.005
Se	1	Kα	Pb	1	Lα	0.0076 ± 0.0004
Br	1	Kα	Pb	1	Lβ	0.0140 ± 0.0005
Se	1	Kα	Br	1	Kα	0.0012 ± 0.0001
Rb	1	Kα	Br	1	Kβ	0.156 ± 0.001
Rb	1	Kα	Pb	1	Lβ	0.0107 ± 0.0004
Sr	1	Kα	Pb	1	Lγ	0.0073 ± 0.0007
Sr	1	Kα	Br	1	Kβ	0.0008 ± 0.0002
Y	1	Kα	Rb	1	Kβ	0.170 ± 0.001
Y	1	Kα	Pb	1	Lγ	0.121 ± 0.002
Y	1	Kα	Br	1	Kβ	0.0008 ± 0.0002
Y	1	Kα	Sr	1	Kβ	0.0025 ± 0.0003
Zr	1	Kα	Sr	1	Kβ	0.166 ± 0.001
Zr	1	Kα	Pb	1	Lγ	0.0088 ± 0.0009
Zr	1	Kα	Br	1	Kβ	0.0009 ± 0.0003
Sb	1	Kα	Cd	1	Kβ	0.0245 ± 0.0008

and

$$\sigma F_{im} = \left[\left(\frac{\sigma N_m}{N_m}\right)^2 + \left(\frac{\sigma N_i}{N_i}\right)^2\right]^{1/2}$$

where σF_{im} = uncertainty in F_{im}

σN_m = uncertainty in N_m

σN_i = uncertainty in N_i

Samples exhibiting chemical composition uncharacteristic of normal ambient aerosols may require additional corrections.

4. Minimum Detectable Concentrations (MDC) on filters are determined by the formula

$$MDC_i = 3\sqrt{B_i \frac{M_i}{N_i}}$$

where

MDC_i = the minimum detectable concentration of element i

M_i = known concentration of element i

N_i = Net number of counts measured when element i is analyzed under standard conditions

B_i = Number of background counts subtracted from total counts in region of interest i to obtain N_i.

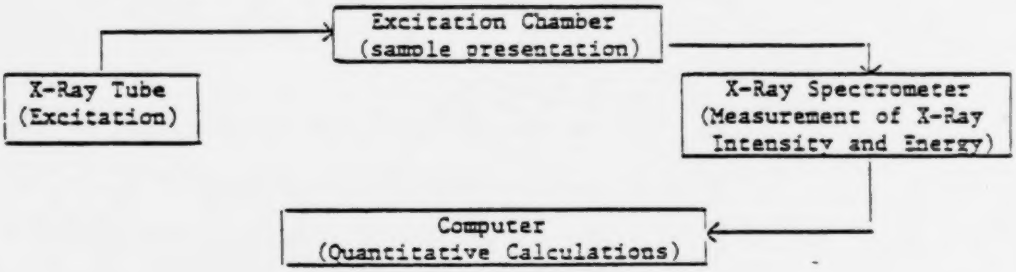
Table 1 lists MDC's for 5 standard analysis conditions.

5. Background Subtraction: Most of the background counts in a region of interest are due to the scattering of primary radiation from the sample. The amount of this scattering depends upon the mass of the sample presented to the primary excitation beam. A blank filter is run under each excitation condition and the background in each region of interest is linearly related to a high energy incoherent scatter peak due to the primary radiation. The same scatter peak is monitored on all loaded samples and the linear relationship is used to estimate the background in the analyte line region of interest.

6. Precision and Accuracy: Count variations of less than 1% are typical over 24 hour periods. Figure 2 shows the variability of the QC filter for the analysis of 630 filters over a period of 2 months (< ±1.5%). All results are reproducible to within 1% when counting statistics are not the primary source of uncertainty. The accuracy in terms of the deposit on the filter is primarily limited by the uncertainties in the standard values which are typically 5%. Errors in the absorption corrections for the low atomic number elements (Z<20) may approach the same order of magnitude as sampling errors.

2. Apparatus

The x-ray fluorescence analyzer used for the analysis is an Ortec TEFA III system. A block diagram of its major components is shown below:

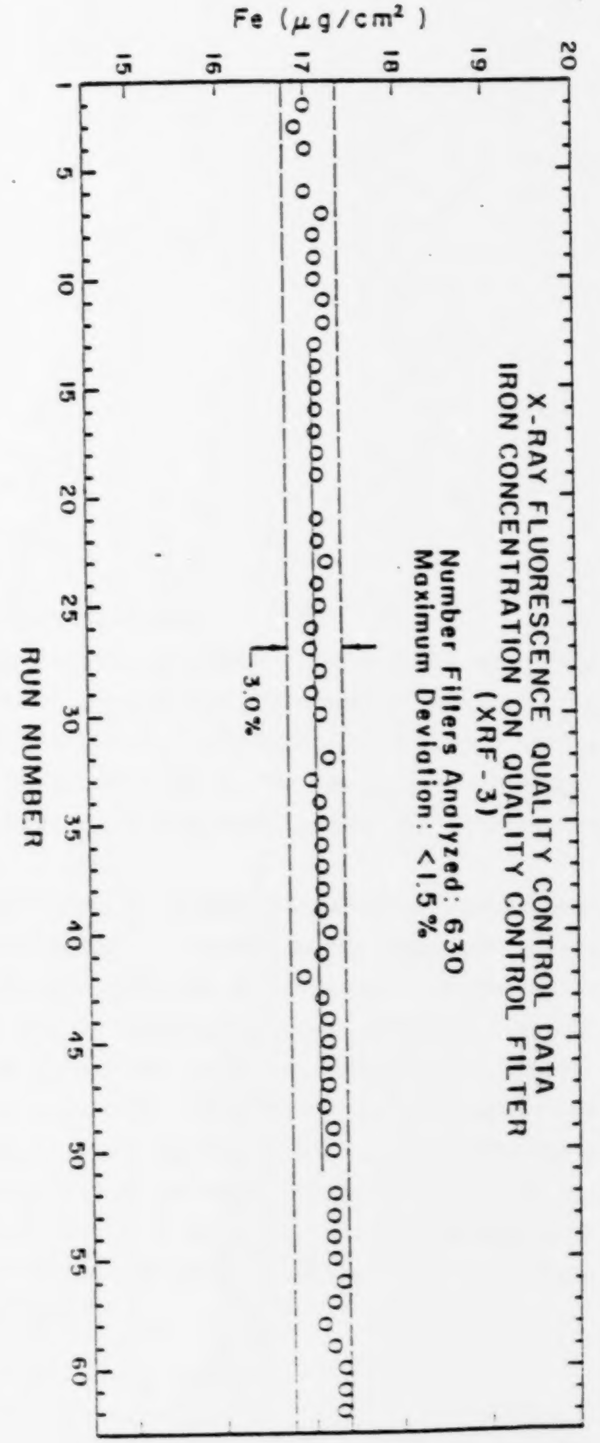

Excitation Chamber
(sample presentation)
X-Ray Tube
(Excitation)
X-Ray Spectrometer
(Measurement of X-Ray Intensity and Energy)
Computer
(Quantitative Calculations)

The primary function of the excitation system is to generate inner shell electron vacancies which result in the emission of x-rays characteristic of the sample elements. The TEFA system has a dual anode Mo/W x-ray tube. Mo and Cu primary x-ray filters can be used to obtain monochromatic excitation.

Air filters are presented to the excitation radiation and spectrometer in an evacuated excitation chamber.

The x-ray spectrometer consists of a Si(Li) x-ray detector amplifier and pulse height analyzer which measures the energy and intensity of the characteristic x-rays generated in the above excitation procedure.

Figure 2

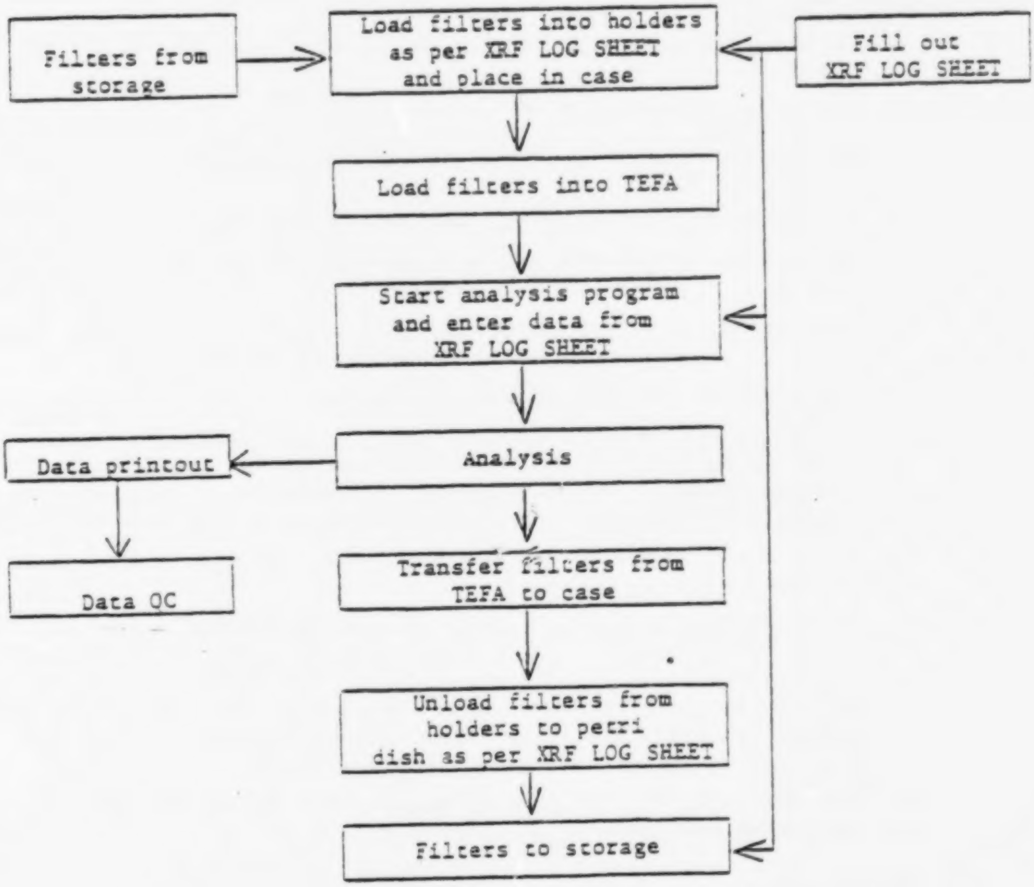

X-RAY FLUORESCENCE QUALITY CONTROL DATA
IRON CONCENTRATION ON QUALITY CONTROL FILTER
(XRF-3)
Number Filters Analyzed: 630
Maximum Deviation: <1.5%
3.0%
Fe (μg/cm²)
20
19
18
17
16
15
RUN NUMBER
1
5
10
15
20
25
30
35
40
45
50
55
60

3. Calibration

The instrument is calibrated with single element thin film vapor deposited standards obtained from Micromatter Co., Eastsound, WA., and with multielement solution deposited standards obtained from Columbia Scientific Industries, Austin, TX. Particle standards obtained from Columbia Scientific Industries are used for Al and Si calibration. Plots of instrument response versus atomic number should yield smooth curves, and are used to validate standard concentrations. The surface concentration relevant to a specific excitation condition for each standard element is listed in the Standards Notebook. The standards are kept permanently mounted in clean, closed containers and are labelled with an ID number.

Standard concentration values are entered into the computer and stored on floppy disk by the ORACL program MAKSTD. The instrument is then calibrated by proceeding with a normal run, and using an "S" prefix for each of the standard ID numbers. Details of software usage are in the TEFA Software Notebook. Calibration should be performed only by supervisory personnel.

4. Flowchart Summary


Filters from storage
Load filters into holders as per XRF LOG SHEET and place in case
Fill out XRF LOG SHEET
Load filters into TEFA
Start analysis program and enter data from XRF LOG SHEET
Data printout
Analysis
Data QC
Transfer filters from TEFA to case
Unload filters from holders to petri dish as per XRF LOG SHEET
Filters to storage

5. Operating Procedure

The TEFA operating manual should be reviewed before operating the instrument. One should be familiar with the hazards of incorrect operation and the safety systems of the TEFA. Only designated personnel should operate the instrument and no procedures other than the ones described here should be performed unless instructed otherwise by the laboratory supervisor.

5.1 TEFA Start-up

1. Obtain TEFA key from the standards cabinet and switch CONTROL POWER to ON.
2. Press the SYSTEM POWER ON button.
3. Obtain the XR program disk from storage and insert in drive 0 (left hand drive).
4. Press the PWR button on the EEDS II control panel.
5. Adjust the MARKER joystick so that elapsed time is displayed on the CRT.
6. Turn on the printer, set to ON LINE, and switch to 8 LPI. Advance paper to top of page using the FORM ALIGN controls.
7. Press HV1 on the EEDS II control panel.
8. Press the DATA ENTRY X-RAYS button. A data parameter is selected by first pressing the RETURN key until the cursor is opposite the desired parameter, then pressing the space bar. Valid entries are displayed on the CRT. Set TUBE VOLTAGE to 5.0 Kv and TRAY SIZE to 12.
9. Press the SYSTEM CONTROL STANDBY button. Make sure the excitation chamber cover is closed.
10. After waiting 3 minutes, press the SYSTEM CONTROL ON button. This turns on the x-rays. The 3 red X-RAYS ON lights in the RADIATION section will come on, the green X-RAYS OFF light will go out, X-RAYS ON will flash on the CRT and the red X-RAYS ON light in the SYSTEM CONTROL section will flash. The excitation chamber cover must remain closed whenever the x-rays are being produced.
11. The TEFA should be allowed to warm up for 30 minutes before beginning analysis.

5.2 Filter Loading

1. Fill out an XRF LOG (Figure 3) with PROJECT NAME, INITIAL, ID numbers and particle size codes (S). If there are also customer ID numbers, record them in the comments column. ID numbers and particle size codes are obtained from the sample LOG Book. Record the date in the XRF column in the Sample Log Book for all samples loaded. All 12 positions need not be filled. Position 1 must be a blank of the same type and preferably the same manufacturing lot as the filters to be analyzed. The blank ID must begin with "B". The last position must be a quality control standard. Obtain its ID number from the laboratory supervisor.

(Rev. August, 1981)

XRF LOG

PROJECT NAME ______________________

DATA DISK ______________________

DATE ______________________

TIME ______________________

ANALYSIS SEQUENCE ______________________

INITIAL:

LOAD ________ ANALYZE ________ UNLOAD ________ QA ________

POSITION	ID					S	COMMENTS
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

(Rev. Augu 1981)

Figure 3

2. Filter loading is done in the laminar flow hood. Turn the hood blower and lights on and clean the work surface with a Kaydry towel and methanol. Lay out a Kaydry towel in the hood. Clean a pair of forceps and the filter loading block with Kimwipes and methanol and place on the towel. Clean an XRF sample case inside and out and place in the hood. Obtain the filters to be analyzed from the sample storage cabinet. Place the filters to be loaded, a set of numbered filter holders, a box of Kimwipes, a methanol container, the XRF LOG and a pen in the hood. The filter containers should be labelled with their ID numbers.

3. Clean the filter holders with Kimwipes and methanol. Pay particular attention to surfaces which the filters will contact. Wear disposable gloves to avoid excess contact with methanol. When finished cleaning the filter holders, remove gloves and rinse hands if gloves are of the talced variety.

4. Select filter holder 1, place on the filter loading block, and remove the retaining ring. If the blank has already been loaded from a previous run, select filter holder 2 instead of 1.

5. Select the filter whose position number as indicated on the XRF LOG corresponds to the filter holder. Note the condition of the filter and record any comments on the XRF LOG that may apply to XRF analysis, such as uneven deposit, wrinkled filter, water spot on filter, etc. Filters with loose deposits should not be analyzed.

6. Remove the filter from its container and place deposit side down in the filter holder. Use forceps and handle the filter only around its perimeter. If the deposit is touched by the forceps, clean them before proceeding.

7. Replace the retaining ring so that the filter is held in place without any wrinkles or other misalignment.

8. Place the numbered filter holder into the like numbered location in the sample case and the filter container in the proper numbered location in the filter container tray. The blank filter holder and container can both be placed in the large section of the filter container tray.

9. Repeat steps 4-8 for the remaining filters. The quality control standard is permanently loaded and is not put into the sample case.

10. Verify that the sample ID number to position number relationship is correct. Each filter holder number must match its position number in the sample case. The ID number on each filter container must correspond to its position in the filter container tray exactly as on the XRF LOG.

11. Place the filter container tray on top of the filter holders in the sample case, put the XRF LOG in the sample case, and transfer to the TEFA.

12. Clean up the laminar flow hood.

5.3 Analyzing Filters

1. Verify that TUBE VOLTAGE is 5.0 Kv and TUBE CURRENT is 1 μamp. Press the SYSTEM CONTROL STANDBY button. Make certain the red X-RAYS ON lights are out and the green X-RAYS OFF light is on. Never open the excitation chamber cover unless this is the case.
2. Lift the excitation chamber cover to its open position.
3. Open the sample case and place the filter container tray in the lid.
4. Transfer each filter holder in sequence to the like numbered position in the TEFA sample tray. Make sure the seating is proper by rotating the filter holder and align the holder so that its indicating line points toward the center of the tray. Close the sample case. If the standard is not already in position, obtain it from the standard cabinet and place in position on the sample tray.
5. Verify that all samples are correctly loaded in their designated positions on the sample tray.
6. Make sure the excitation chamber gasket is properly seated and close the cover.
7. Push the X-RAY PATH PUMP button. The pump will quiet down after 10-20 seconds if the chamber is properly sealed.
8. Press the SYSTEM CONTROL ON button. The red X-RAYS ON lights will come on and the green X-RAYS OFF light will go out.
9. Select a formatted, zeroed disk and write the PROJECT NAME on the disk label. Use a felt tipped pen. Record both the data disk and program disk numbers on the XRF LOG, as well as INITIAL, DATE, TIME, and ANALYSIS SEQUENCE. Obtain the analysis sequence number from the laboratory supervisor. Insert the data disk into drive 1 (right hand side).
10. Record the date, project, initial, and data disk number in the TEFA Log Book.
11. Press the DATA ENTRY X-RAYS button to return to spectrum mode, then press OPERATING MODE TERMINAL. Type "C" while holding down the CTRL key. Type R ORACL <RETURN>. Type RUN XR <RETURN>. Enter data as requested by the program and displayed on the CRT. If there are less than 12 samples, simply press return when asked for the next sample. Before verifying the particle size codes, check to see that the X-RAY PATH VACUUM READY light is on. Sample analysis begins when the particle size codes are verified and proceeds automatically from sample to sample for each excitation condition.
12. When analysis is complete, indicated by 5 beeps, press the DATA ENTRY X-RAYS button and verify that tube voltage is 5.0 Kv and tube current is 1 μamp. Press the X-RAY PATH OFF and SYSTEM CONTROL STANDBY buttons. The green X-RAYS OFF light should come on and the red X-RAYS ON lights should go out.

13. Remove the data disk and place in storage. Advance the printout to top of the page and give printout to laboratory supervisor for review.
14. When excitation chamber has reached room pressure, check that red X-RAYS ON lights are out and green X-RAYS OFF light is on, and open chamber cover.
15. Transfer in sequence each filter holder from the TEFA sample tray to its like numbered position in the sample case. If the next run will use the same blank and/or quality control standard, they may be left in the sample tray. Otherwise return the blank to the sample case and the standard to its container in the standards cabinet.
16. Close the excitation chamber cover, place the XRF LOG in the sample case and transfer to the laminar flow hood for unloading.

5.4 Unloading Filters

1. Filter unloading is done in the laminar flow hood. Turn on the hood blower and lights and clean the work surface with a Kaydry towel and methanol. Lay out a Kaydry towel in the hood. Clean a pair of forceps and the filter loading block with Kimwipes and methanol and place on the towel. Place the sample case in the hood. Record your initial on the XRF LOG.
2. Select a filter holder and the corresponding filter container from the sample case. Check that the sample ID matches position number exactly as on the XRF LOG. Place the filter holder on the loading block and the filter container next to it.
3. Remove the retaining ring and transfer the filter to its container. Usually it is easiest to hold the filter holder over the open filter container and carefully invert the filter holder so that the filter drops deposit side up into its container. Sometimes use of the forceps is necessary. Replace the filter container lid and set aside. Set the filter holder aside.
4. Repeat steps 2 and 3 for the remaining filters.
5. Return the filters to the sample storage cabinet, the filter holders to the standards cabinet and the XRF LOG to the laboratory supervisor.
6. Clean up the laminar flow hood.

5.5 TEFA Shutdown

1. Verify that tube voltage is 5.0 Kv, and tube current is 1 μamp.
2. Press the SYSTEM CONTROL STANDBY and then SYSTEM CONTROL OFF buttons.
3. Press HV1 on the EEDS II control panel to turn off the high voltage.

4. Turn off the printer.
5. Press the PWR button on the EEDS II control panel to turn off power.
6. Press the SYSTEM POWER OFF button.
7. Switch CONTROL POWER to OFF and place key in the standards cabinet.
8. Return the XR program disk to storage, and close the disk drive doors.

6. Calculations

The count rate, I_i, of x-ray photon events from element i measured by the Si (Li) detector is proportional to the mass of element i, M_i, times an attenuation factor, A_i, which takes into consideration the absorption of the primary excitation and characteristic x-rays in the sample. That is,

$$I_i = K_i M_i A_i \tag{1}$$

where K_i is a proportionality constant. An unknown mass, M_i, may be determined by comparing the count rate measured for the unknown with the count rate, I_i^s, measured with a known standard mass M_i^s.

$$M_i = \frac{I_i\, C_i}{A_i} \tag{2}$$

where C_i is a calibration factor,

$$C_i = \frac{A_i^s\, M_i^s}{I_i^s}\ . \tag{3}$$

The uncertainties in M_i and C_i are given by

$$\sigma M_i = M_i \left[\left(\frac{\sigma C_i}{C_i}\right)^2 + \left(\frac{\sigma I_i}{I_i}\right)^2\right]^{\frac{1}{2}} \tag{4}$$

and

$$\sigma C_i = C_i \left[\left(\frac{\sigma M_i^s}{M_i^s}\right)^2 + \left(\frac{\sigma I_i^s}{I_i^s}\right)^2\right]^{\frac{1}{2}} \tag{5}$$

$$\frac{\sigma M_i^s}{M_i^s} = 0.05 \text{ per manufacturers specifications.}$$

Energy Dispersive X-Ray Fluorescence Analysis of Air Filters

Table 3

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EXCITATION CONDITION: 1
ANODE: MO
FILTER: MO
VOLTAGE: 50
CURRENT: 200
ENERGY:0- 40

SPECTRUM REGIONS OF INTEREST

REGION	CHANNEL	ENERGY	ELEMENT
1	156- 164	6.24- 6.56	FE
2	183- 191	7.32- 7.64	NI
3	197- 205	7.88- 8.20	CU
4	212- 220	8.48- 8.80	ZN
5	227- 235	9.08- 9.40	GA
6	247- 251	9.88- 10.04	HG
7	258- 269	10.32- 10.76	AS
8	276- 281	11.04- 11.24	SE
9	292- 302	11.68- 12.08	BR
10	310- 320	12.40- 12.80	PB
11	329- 339	13.16- 13.56	RB
12	348- 358	13.92- 14.32	SR
13	369- 379	14.76- 15.16	Y
14	389- 399	15.56- 15.96	ZR
15	412- 426	16.48- 17.04	MS*
16	521- 537	20.84- 21.48	PD
17	544- 560	21.76- 22.40	AG
18	568- 584	22.72- 23.36	CD
19	597- 613	23.88- 24.52	IN
20	623- 639	24.92- 25.56	SN
21	657- 664	26.28- 26.56	SB
22	790- 808	31.60- 32.32	BA
23	827- 845	33.08- 33.80	LA

* Mo Ka scatter

EXCITATION CONDITION: 2
ANODE: MO
FILTER: --
VOLTAGE: 15
CURRENT: 200
ENERGY:0- 10

SPECTRUM REGIONS OF INTEREST

1	118- 132	1.18- 1.32	MG
2	141- 155	1.41- 1.55	AL
3	167- 181	1.67- 1.81	SI
4	193- 209	1.93- 2.09	P
5	324- 338	3.24- 3.38	K
6	365- 376	3.65- 3.76	CA
7	631- 649	6.31- 6.49	FE

EXCITATION CONDITION: 3
ANODE: W
FILTER: CU
VOLTAGE: 35
CURRENT: 200
ENERGY:0- 20

SPECTRUM REGIONS OF INTEREST

REGION	CHANNEL	ENERGY	ELEMENT
1	112- 120	2.24- 2.40	S
2	127- 135	2.54- 2.70	CL
3	162- 170	3.24- 3.40	K
4	180- 190	3.60- 3.80	CA
5	221- 231	4.42- 4.62	TI
6	243- 253	4.86- 5.06	V
7	266- 276	5.32- 5.52	CR
8	290- 300	5.80- 6.00	MN
9	313- 326	6.26- 6.52	FE
10	520- 534	10.40- 10.68	AS
11	585- 605	11.70- 12.10	BR
12	620- 640	12.40- 12.80	PB

Finally, the corrected counts are divided by analysis live time, L, to obtain the count rate,

$$I_i = \frac{T_i}{L} \tag{10}$$

$$\text{and } \sigma I_i = \frac{\sigma T_i}{L} \; . \tag{11}$$

Calculations for instrument calibration are similar except that C_i is solved for in eq. 3. Also, since single element and non-interfering multi-element standards are used for calibration, spectral corrections are not made and $T_i = N_i$ and $\sigma T_i = \sigma N_i$.

7. Quality Control

The filters are loaded and unloaded into specially machined acrylic holders. Filter loading is done in the laminar flow hood and the filters themselves are handled with forceps, out of the analysis and deposit area. The loaded filters are transported to and from the TEFA in covered sample cases, and the filter holders are cleaned between each use. These procedures prevent the possibility of sample contamination.

To prevent confusion in identification of the samples when they are out of their ID coded filter containers, a sample position number versus ID number relationship used. This relationship is established by the XRF LOG before the filters are removed from their containers and it is verified after each handling step in the procedure.

For each XRF analysis batch of 10 samples, one blank and a quality control standard is analyzed. Measured concentrations of the quality control standard, which contains several key elements, are compared with actual concentrations (Figure 4). If the deviation is more than ± 2%, all samples of that run must be reanalyzed. The results of the quality control standard over a number of runs provides a measure of the XRF analysis precision. If the results show a trend in drift, recalibration is required.

Several elements, including K, Ca, Fe, As, Br and Pb are measured under more than one of the three excitation conditions normally used for each run. Results of these elements are compared for each of the excitation conditions under which they are measured. If agreement is for outside the calculated uncertainties, the sample must be reanalyzed.

```
FRT EAST 8
QA STANDARD QS043
EL     CONCENTRATION        % ERROR
    ACTUAL      MEASURED
TI   40.80   41.19+-  2.07      1.0
CR   44.30   44.79+-  2.25      1.1
FE   44.90   44.85+-  2.26   - 0.1
NI   47.30   47.05+-  2.36   - 0.5
ZN   44.80   44.89+-  2.25      0.2
CD   49.70   49.50+-  2.53   - 0.4


FRTEAST9
QA STANDARD QS043
EL     CONCENTRATION        % ERROR
    ACTUAL      MEASURED
TI   40.80   41.23+-  2.07      1.1
CR   44.30   44.92+-  2.25      1.4
FE   44.90   45.09+-  2.27      0.4
NI   47.30   46.94+-  2.36   - 0.8
ZN   44.80   44.80+-  2.25      0.0
CD   49.70   49.66+-  2.53   - 0.1


FRTEAST10
QA STANDARD QS043
EL     CONCENTRATION        % ERROR
    ACTUAL      MEASURED
TI   40.80   40.99+-  2.06      0.5
CR   44.30   44.99+-  2.26      1.6
FE   44.90   45.39+-  2.28      1.1
NI   47.30   47.05+-  2.36   - 0.5
ZN   44.80   44.94+-  2.25      0.3
CD   49.70   49.42+-  2.52   - 0.6


FRT EAST 11
QA STANDARD QS043
EL     CONCENTRATION        % ERROR
    ACTUAL      MEASURED
TI   40.80   40.91+-  2.05      0.3
CR   44.30   44.57+-  2.23      0.6
FE   44.90   45.03+-  2.27      0.3
NI   47.30   47.07+-  2.36   - 0.5
ZN   44.80   44.76+-  2.25   - 0.1
CD   49.70   49.03+-  2.50   - 1.3


FRT EAST 12
QA STANDARD QS043
EL     CONCENTRATION        % ERROR
    ACTUAL      MEASURED
TI   40.80   40.82+-  2.05      0.1
CR   44.30   44.75+-  2.24      1.0
FE   44.90   44.62+-  2.24   - 0.6
NI   47.30   46.63+-  2.34   - 1.4
ZN   44.80   44.22+-  2.22   - 1.3
CD   49.70   49.33+-  2.52   - 0.7


FRT EAST 13
QA STANDARD QS043
EL     CONCENTRATION        % ERROR
    ACTUAL      MEASURED
TI   40.80   41.05+-  2.06      0.6
CR   44.30   44.80+-  2.26      1.1
FE   44.90   44.94+-  2.26      0.1
NI   47.30   46.97+-  2.36   - 0.7
ZN   44.80   44.7[illegible]+-  2.25   - [illegible]
CD   49.70   49.7[illegible]+-  2.51   - [illegible]
```

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(Rev. August, 1981)

8. Quality Assurance

Calibration of the instrument is by thin film standards prepared by Micromatter, Inc., Eastsound, WA., and by solution deposited and particle standards made by Columbia Scientific Industries, Austin, TX. Plots of instrument response versus atomic number should yield smooth curves, and are used to validate standard concentrations.

Interlaboratory comparisons are used to check accuracy of the instrument calibration. Several techniques have been used in interlaboratory comparisons in addition to energy dispersive x-ray fluorescence, including neutron activation analysis, optical spectroscopy, wavelength dispersive x-ray fluorescence, and ion chromotography.

In house intermethod comparison with neutron activation analysis is done routinely. This independent method provides comparison with XRF on about 20 elements.

Results from each analysis run are reviewed by the laboratory supervisor. The inter-excitation and quality control standard results are checked as described in section 7. The laboratory supervisor must initial the XRF LOG before results of that run are considered valid. Periodic audits of the TEFA startup, filter loading and unloading, analysis, and TEFA shutdown procedures insure compliance with the Standard Operating Procedure.

QUALITY ASSURANCE PLAN

(ORGANIC AND ELEMENTAL CARBON ANALYSIS)

1. QA Objectives in Terms of Precision, Accuracy, Completeness, Representativeness, and Comparability.
   a. Precision. Replicate measurements of organic, elemental, and carbonate carbon should correspond to a standard deviation of ±15%.
   b. Accuracy. Analyses will be expected to be accurate to within ±15%.
   c. Completeness. Analytical results will be obtained for essentially all samples delivered to OGC.
   d. Representativeness. Not applicable.
   e. Comparability. All data will be reported in μg of carbon per m^3 of air at 25°C and 760 mm.
2. Sample Custody.

Mr. Cliff Frazier will be responsible for the custody of the samples.

3. Calibration Procedures and Frequency.

Calibration is accomplished in two ways. At the end of each run a known amount of CH_4 gas is injected into the oven and the response measured. Thus, a single point calibration is included in every run. The second calibration procedure involves the measurement of filter samples containing known amounts of specific carbonaceous materials. This will be done on a monthly basis.

4. Analytical Procedures.

The initial configuration of the carbon analyzer was conceptually simple. An aerosol sample on a glass or quartz fiber filter segment was heated to 600°C in a He atmosphere for the purpose of volatilizing organic carbon.

The volatilized organic carbon was oxidized to CO_2 in a MnO_2 bed at 900°C, reduced to CH_4 and measured by a flame ionization detector (FID). Elemental carbon was measured by introducing O_2 into the sample oven and combusting the carbon to CO_2 which was measured as above. Early in the project a difficulty in this method of speciation was discovered; namely, during the organic analysis a fraction of the organic carbon was pyrolytically converted to elemental carbon. This was manifested by an increase in the "blackness" of the filter at the end of the organic analysis. The degree of pyrolytic conversion was variable and could not be related in any simple manner to measurable properties of the sample.

To overcome this difficulty, the system which is now in use was developed. It involves modifications in the combustion method itself, the addition of an optical system for the continuous monitoring of filter reflectivity, and the automation of the analytical sequence by microprocessor technology. The system is shown schematically in Figures 1 and 2 . As described below, the optical system is used to correct for the pyrolytic conversion of organic to elemental carbon.

In the combustion method which is currently in use, the filter segments to be analyzed are placed in the quartz sample boat, the combustion zone temperature set to 350°C, and the oven purged with an O_2(2%)-He(98%) mixture. The boat is then inserted into the combustion zone in which oxidation and volatilization of organic carbon into the flowing O_2-He stream occur. The volatilized carbon is oxidized to CO_2 in the MnO_2 bed, reduced to CH_4, and measured as described above. This step typically removes about 2/3 of the organic carbon. On the basis of the reflectivity measurements no net oxidation of elemental carbon occurs, and conversion of organic to elemental carbon is minimized during this

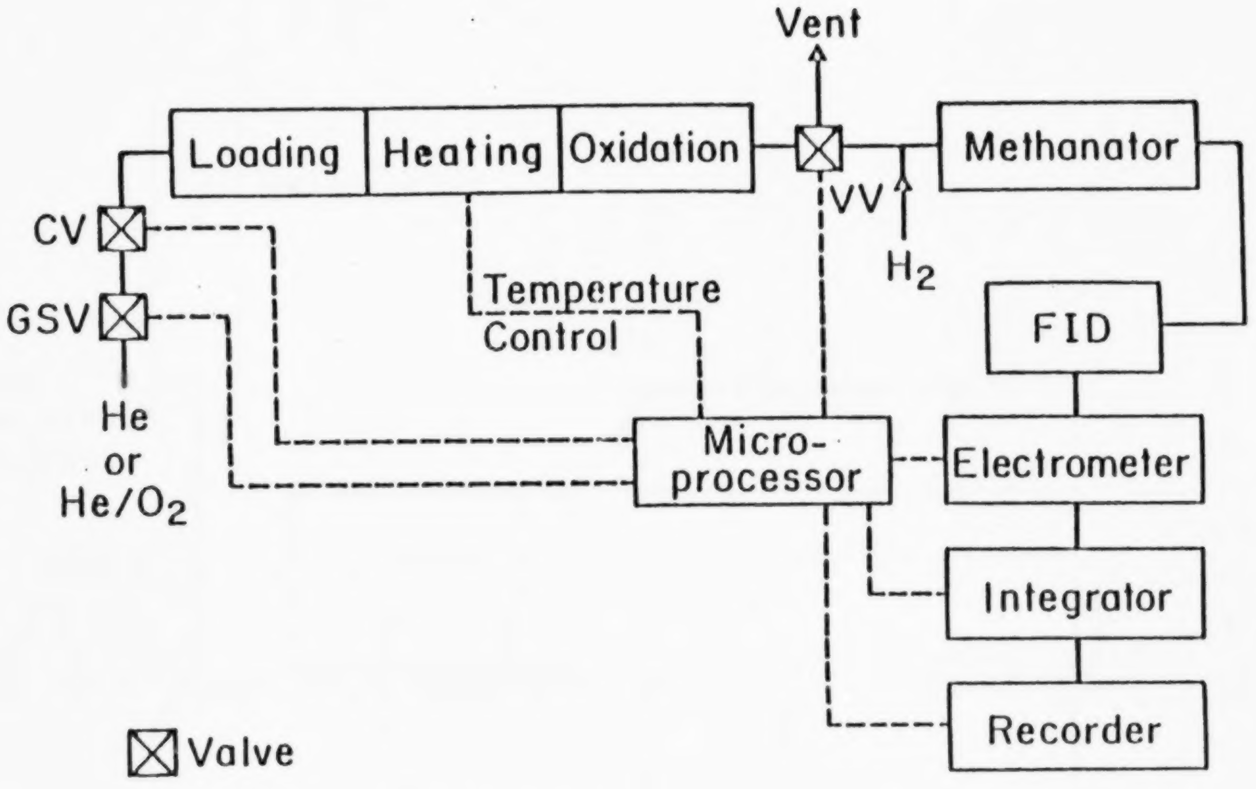

Vent
Loading
Heating
Oxidation
VV
Methanator
H_2
CV
GSV
Temperature Control
FID
He or He/O_2
Micro-processor
Electrometer
Integrator
Recorder
Valve

Figure 1 Block diagram of the carbon analyzer.

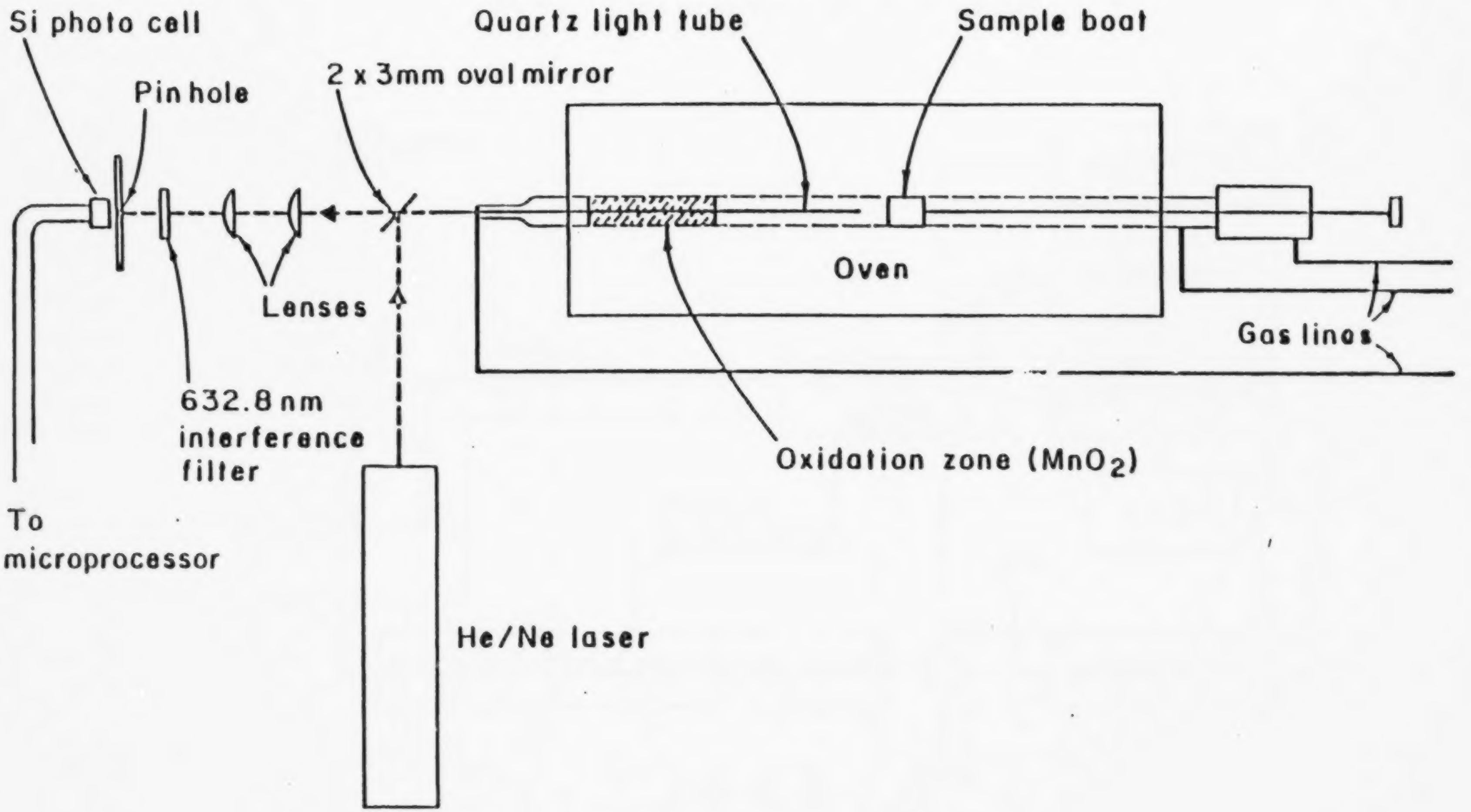

Si photo cell
Pin hole
2 x 3mm oval mirror
Quartz light tube
Sample boat
Oven
Lenses
Gas lines
632.8 nm interference filter
Oxidation zone (MnO_2)
To microprocessor
He/Ne laser

Figure 2. Combustion oven and optical system.

step. The latter is apparently inhibited by the oxygen in the carrier gas. The sample oven is then purged with helium such that all oxygen is removed from the oven. During this process the sample remains in the oven, and the oven temperature is maintained at 350°C. When purging is complete, the combustion zone temperature is raised to 600°C, and the remaining organic carbon is volatilized into the helium carrier gas. This carbon is measured as above.

For the measurement of elemental carbon the combustion zone temperature is dropped to 400°C following which the carrier gas is changed to O_2(2%)-He (98%). The sample remains in the oven during this process. After 100 seconds under these conditions, the temperature is raised to 500°C where it is held for 120 seconds and finally to 600°C where it is held for 200 seconds. During this step-wise combustion the evolved CO_2 is measured as usual. The purpose of the step-wise combustion is to facilitate the pyrolysis correction.

Throughout the combustion process the reflectivity of the filter sample is continuously monitored by a 633 nm He-Ne laser system. The time course of the reflectivity is shown in Figure 3. At 350°C in O_2/He little change in the reflectivity is observed, indicating no net oxidation of elemental carbon or pyrolytic conversion of organic to elemental carbon. As the temperature is raised to 600°C in He, however, the reflectivity decreases, indicating an increase in elemental carbon. The step-wise combustion of elemental carbon in the third phase of the analysis results in an increase in the reflectivity corresponding to the oxidation of elemental carbon. The pyrolysis correction is determined by measuring the amount of elemental carbon oxidation necessary to return the filter reflectivity to the value it had before pyrolysis occurred. The shaded area in Figure 3b corresponds to the pyrolysis correction.

Figure 3 (a) Filter reflectivity as a function of time.
(b) FID output as a function of time.
The cross-hatched section of the 400-500-600°C O_2/He peak corresponds to the correction for the pyrolytic production of elemental carbon.

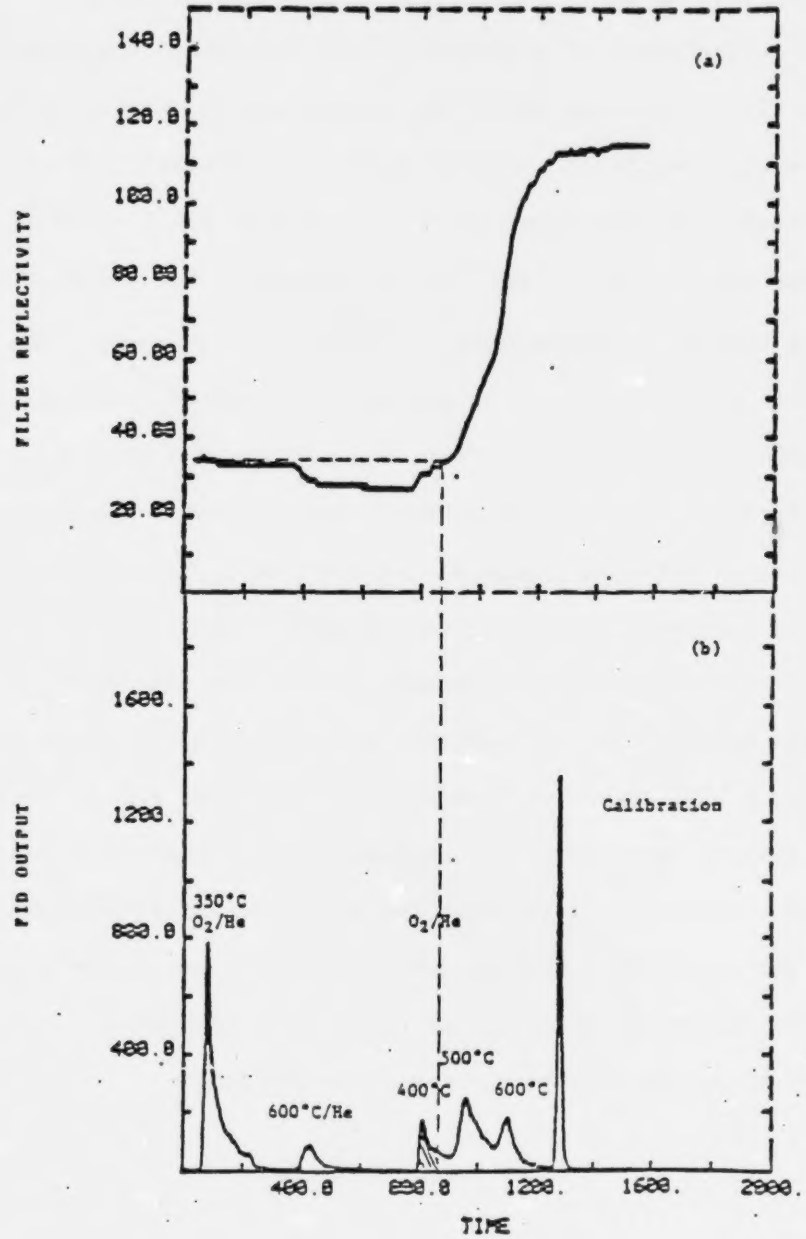


Figure 3

The analytical system is under the control of a microcomputer built around a Motorola 6802 microprocessor. All switching of gas flows, timing, temperature control, pyrolysis correction, analog to digital conversion electronics, electrometer functions, signal integration, data storage, and data outputs are controlled by the computer system. All data (FID output, reflectivity, combustion zone temperature, integrated peak areas, pyrolysis correction, and time) are stored on a cassette tape which can be analyzed at a later date on the OGC PRIME 350 computer. The only operator interaction during the analysis is to enter the filter identification code into the microcomputer and load the sample into the system.

5. Data Analysis, Validation, and Reporting.

Data will be recorded on both cassette magnetic tape and on the x-y plot generated at the time of analysis. The data stored on the tape are processed by the OGC PRIME 350 computer. The processing involves peak integration, blank subtraction, pyrolysis correction, and conversion to scientific units. The master equation is:

$$\mu\text{gC/m}^3 = \left\{\left[\frac{(\text{peak area})}{\begin{pmatrix}\text{calibration}\\ \text{peak area}\end{pmatrix}} \times \begin{pmatrix}\text{mass of carbon}\\ \text{in calibration}\\ \text{peak}\end{pmatrix} \times \left(\frac{1}{\text{area of filter segment analyzed}}\right)\right] - \text{blank } (\mu\text{gC/cm}^2)\right\} \times \frac{\text{total area of filter}}{\text{volume of air sampled}}$$

In this equation "peak area" has already been corrected for pyrolysis as described in Section 4.

Several criteria will be used to validate an individual analysis. The first concerns the shape of the calibration peak. If injection of the CH_4 calibration gas results in two peaks, this is indicative of incomplete oxidation in the MnO_2 oxidation zone. If this is observed, then the oven must be re-packed with fresh MnO_2. The second criterion concerns the magnitude of the calibration peak. If this is significantly low ($\gtrsim$ 15% with respect to the average) or shows a decreasing trend, a loss of efficiency in the methanation process is indicated. This can be corrected by re-packing the methanator with fresh Ni/firebrick. The trend of calibration peak areas will be checked at the end of each analysis day, and relevant comments entered in a QA log book. Finally, an optical absorption measurement of each filter will be made to validate the elemental carbon measurement. Absorption will be plotted as a function of measured elemental carbon concentration (μgC/cm^2). Obvious outliers will be re-analyzed.

The data flow in this program is almost totally automated. The output of the carbon analyzer is recorded on a cassette magnetic tape which is processed on the OGC PRIME 350 computer. The only operator interaction is to enter filter codes and air volumes into the computer file. This information will be checked for accuracy from a hard-copy printout. Emily Heyerdahl will be primarily responsible for handling this data flow.

6. Internal Quality Control Checks.

   a. Standard filter. At the beginning of each day a "standard filter" will be analyzed. The "standard filter" is an actual high volume filter sample collected in Portland, Oregon. Many analyses have been made from this filter. If the standard filter analysis differs from the average by more than 2 standard deviations, the standard filter will be re-analyzed. If the re-analysis is within the above limit, then routine analysis will proceed. If not, the cause of the problem will be investigated and corrected.

b. Calibration. Each run will be individually calibrated. As discussed in Section 5, the shape and magnitude of the calibration peak relate to the analytical efficiency. In addition, at the beginning of each day CH_4 calibrations are performed in both He and He/O_2 carrier gases. If these do not agree to within 10%, the source of the discrepancy will be investigated and corrected.

c. External Standards. Filter segments containing known amounts of organic, elemental, or carbonate carbon will be analyzed once each month. These will be prepared by Richard Johnson and submitted blind to Emily Heyerdahl who will analyze them.

7. Performance and System Audits.

This is accomplished by the actions of Sections 5 and 6.

8. Preventive Maintenance.

The primary components requiring preventive maintenance are the oxidation and methanation ovens and the optical system. The diagnostic tests and maintenance procedures for the ovens were discussed in Section 5. In the optical system the light pipe between the oxidation oven and the detector occasionally deteriorates with respect to light transmission. This is manifested by an apparent decrease in reflected light from a blank filter. When this occurs, the only remedy is to replace the light pipe.

9. Specific Procedures to Be Used to Routinely Assess Data Precision, Accuracy, and completeness.

Precision will be assessed in two ways. As discussed in Section 7, a "standard filter" is analyzed at the beginning of each day. These standard filter analyses are tabulated and stored in a computer file. The standard deviations for organic, elemental, and carbonate carbon will be calculated in the usual manner. In addition, replicate analyses are performed on approximately one out of ten filters. The absolute differences (as $\mu gC/cm^2$) between the analyses will be tabulated and stored in a computer file. Standard deviations will also be calculated.

Accuracy will be determined from the monthly measurement of external standards. In addition, interlaboratory comparisons will be conducted from time to time.

10. Corrective Action.

This has been discussed in Section 5.

11. Quality Assurance Reports to Management.

The results of the analyses of the standard filters, replicate filters, and external standards will be transmitted to Dr. John A. Cooper.

4. Sampler

Samplers must be calibrated when first purchased, after major maintenance on the sampler (e.g., replacement of motor or motor brushes), any time the flow-rate measuring device (i.e., rotameter or recorder) has to be replaced or repaired, or any time a one-point audit check deviates more than $\pm$ 7% from the calibration curve.

In using the orifice calibration unit to calibrate a sampler, corrections must be made to the indicated flow rate if the ambient barometric pressure or temperature is substantially different from the pressure or temperature values recorded when the orifice unit was calibrated. Calculate the corrected flow rate as follows:

$$Q_2 = Q_1\left(\frac{T_2P_1}{T_1P_2}\right)^{1/2}$$

where

Q_2 = corrected flow rate at sampling conditions, m^3/min;

Q_1 = uncorrected flow rate read from the orifice unit calibration curve for a given pressure, in. H_2O;

T_1 = absolute temperature when orifice unit was calibrated, ^oK;

P_1 = barometric pressure when orifice unit was calibrated, mmHg;

T_2 = absolute temperature while calibrating the sampler, ^oK, and

P_2 = barometric pressure while calibrating sampler, mmHg.

For example, if $P_1 = P_2$, Figure 2.8 shows the percentage change of Q versus temperature differences. If T_2 is greater than T_1, the percentage change is positive; if T_2 is less than T_1, the percent change is negative. The same procedure is used to correct for pressure differences. The above formula corrects for field conditions only.

(Rev. 7/14/81)

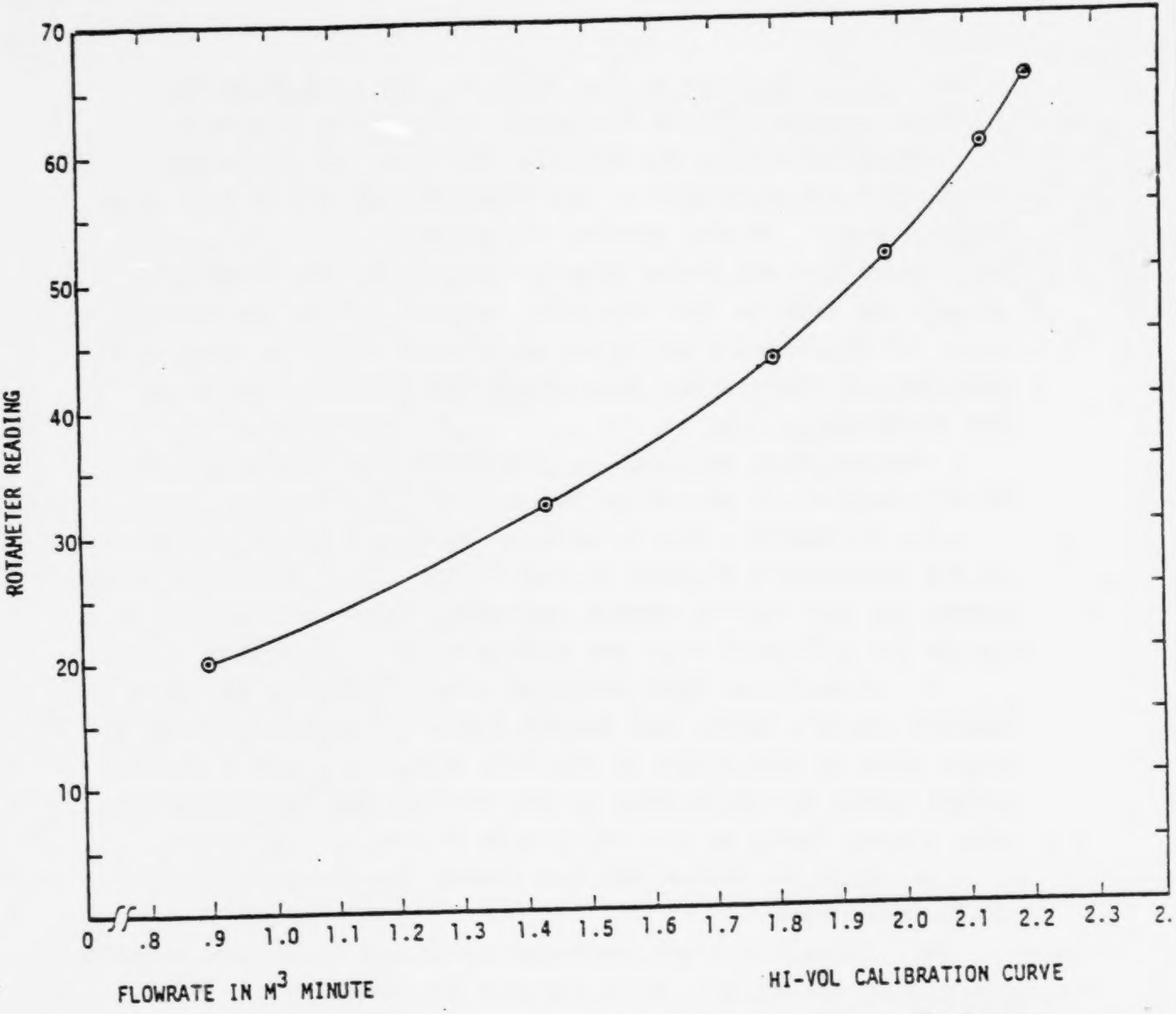
5. Calibration of Hi Vol Sampler with Flow Recorder - Connect the calibration equipment as shown in Figure 2-13.

All data during the initial and final calibrations for one hi vol are recorded on the same page in the Hi Vol Calibration Log. If the sampler is being calibrated for the first time or if it has been serviced, record the data on the "Initial" section of the calibration log. If the sampler is being calibrated prior to scheduled maintenance, record the data under the "Final" section of the calibration log.

The stepwise calibration procedure for this model of Hi Vol sampler is presented below:

1. Assemble a hi vol with a clean filter and operate it for at least 5 minutes at 115 volts. If a step-down transformer is used during normal operation, then calibration should be performed with the transformer in operation.
2. Record the flow recorder number and date on three gummed labels. Affix one gummed label to the very top of the metal face on the front of the flow recorder. Affix another gummed label to the middle of the vacuum hose and affix the last gummed label to the other side of the hi vol motor.
3. Turn the motor OFF and attach the flow recorder to the hi vol motor.
4. Install a clean recorder chart and check the recorder for proper operation. Zero the pen if necessary.
5. Remove the filter holder.
6. Attach the calibrated orifice with one of the load plates between the motor and the orifice.
7. Turn the motor ON and record the water manometer and flow recorder readings after they stabilize.
8. Turn the motor OFF.
9. Repeat Steps 6-8 for each of the other load plates.

(Rev. 7/14/81)



Temperature 25° Barometric Pressure 760mm
Calibration log page no. 18 Hi Vol. No. 5
Date February 16, 1976 Analyst B.J. Smith

Example of hi vol calibration curve

10. Repeat Steps 6-9 once.

11. Determine and record the air flow rate as read from the hi vol orifice calibration curve for each flow recorder reading.

12. Record the barometric pressure in mm Hg and temperature in °C.

13. Determine the percent difference between the temperature and barometric pressure recorded and the temperature and barometric pressure measured when the hi vol orifice was calibrated.

   a. If the recorded barometric pressure is within ±15 percent range and the recorded temperature is within ±100 percent range proceed to step 16.

   b. If the barometric pressure exceeds the ±15 percent range or the temperature exceeds the ±100 percent range or both occur proceed to step 14.

14. Convert the temperature measured when the hi vol orifice was calibrated (T_1) and the temperature recorded in Step 12 above (T_2) to absolute temperature (°K).

15. Determine the true flow rates corrected to the barometric pressure and temperature recorded in Step 12 above. This is done by substituting each of the flow rates determined in Step 15 above for Q_1 in the following equation and solving for Q_2.

$$Q_2 = Q_1\left(\frac{T_2P_1}{T_1P_2}\right)^{1/2}$$

where

Q_1 = flow rate determined in Step 15 above

Q_2 = corrected flow rate

P_1 = barometric pressure measured when the hi vol orifice was calibrated

P_2 = barometric pressure recorded in Step 12 above

T_1 = absolute temperature determined at the time the hi vol orifice was calibrated, °K

T_2 = absolute temperature determined from Step 12, °K.

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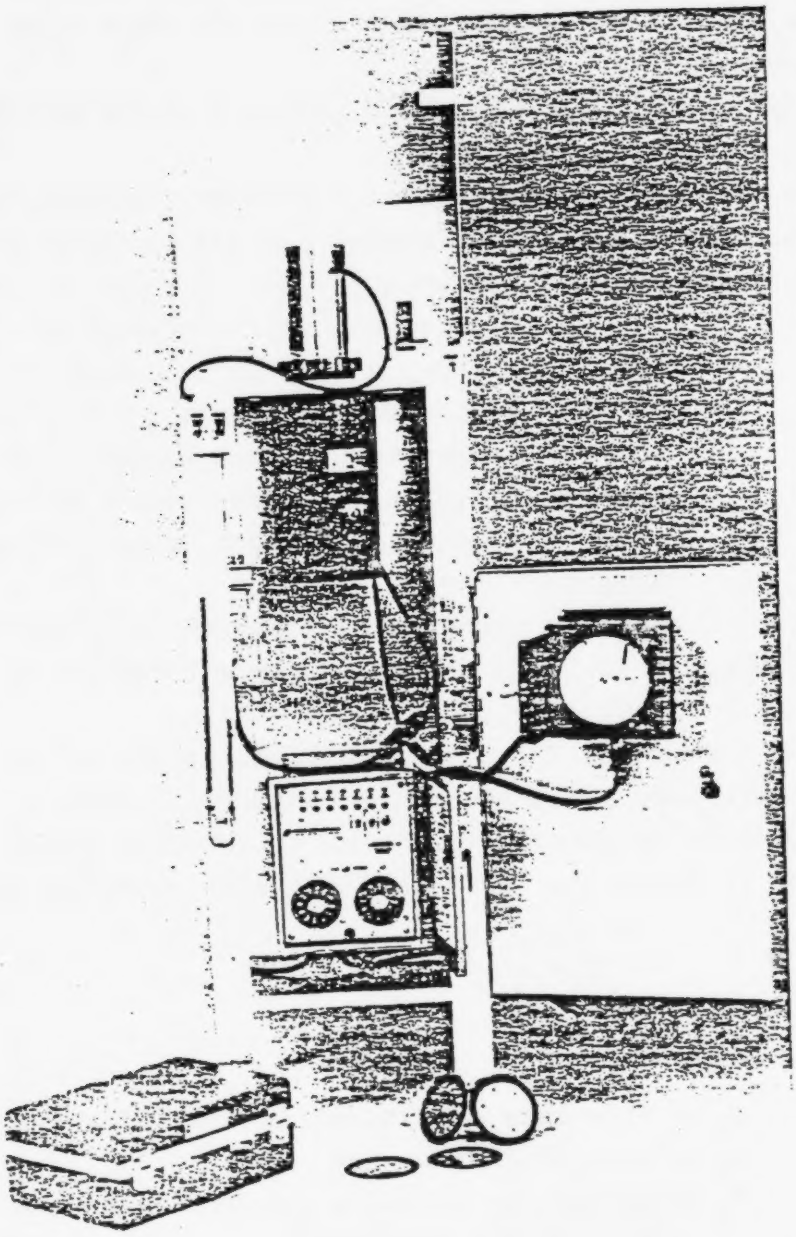

Figure 2-13. Hi vol and orifice assembled for calibration with flow recorder.

(Rev. 7/14/81)

16. Plot the flow recorder readings vs. the air flow rates.

17. Use a French curve or a curve fitting technique such as the least squares fit, to draw a best fit smooth curve through the calibration points.

18. If any calibration point does not fall within ± 5 percent of the curve, or causes the curve to be S-shaped or have a sharp turn, rerun that point, recalculate, and replot. The percent deviation can be calculated by taking the questionable flow rate (Q_o) and the calibration curve flow rate (Q_c) for the same flow meter reading.

$$\text{Percent deviation} = \frac{(Q_o - Q_c)}{Q_c} \times 100$$

should fall within ± 5 percent.

Table 2.1 ACTIVITY MATRIX FOR CALIBRATION OF EQUIPMENT

Equipment	Acceptance limits	Frequency and method of measurement	Action if requirements not met
Analytical balance	3 to 5 standard weights covering normal range of filter weight, all with indicated weight = true weight ± 0.0005 g	Gravimetric test weighing at purchase and when performing periodic calibration checks	Have balance maintained and calibrated by manufacturer's representative
Relative humidity indicator	Indicator reading = psychrometer reading ± 6%	Comparison with reading of wet-bulb dry-bulb psychrometer on receipt and at 6-month intervals	Adjust or replace to attain acceptance limits
Timer	±15 minutes/24 hours	Check at purchase and quarterly against elapsed time meter	Adjust and repeat test
Elapsed time meter	±2 minutes/24 hours	Standard timepiece (known accuracy) at receipt and at 6-month intervals	Adjust or replace time indicator to attain acceptance limits
Orifice calibration unit	Indicated flow rate = actual flow rate ± 4%	Flow rate primary standard at receipt and 1-year interval	1) Adopt new calibration curve if evidence of orifice damage is absent 2) Replace orifice unit if evidence of damage is present
Sampler	$\frac{\lvert Q_o - Q_c \rvert}{Q_c} \leq 0.05$ Q_o = observed flow rate Q_c = flow rate from calibration curve	Calibration orifice unit, on receipt and after major maintenance on sampler	Rerun points for which $\frac{\lvert Q_o - Q_c \rvert}{Q_c} > 0.05$ until acceptance limit attained

· Plot a graph of Q_1 vs P_t on two-cycle, semi-log graph paper to obtain the hi vol orifice calibration line as illustrated in Figure 2.7. Use a straight edge to draw a best fit line through the calibration points.

· If any calibration point does not fall within ± 1 percent of the line, rerun that point, recalculate, and replot. The percent deviation can be calculated by taking the questionable flowrate (Q_o) and the calibration line flowrate (Q_c) for the same P_t reading.

$$\text{Percent Deviation}^{a} = \frac{(Q_o - Q_c)}{Q_c} \times 100$$

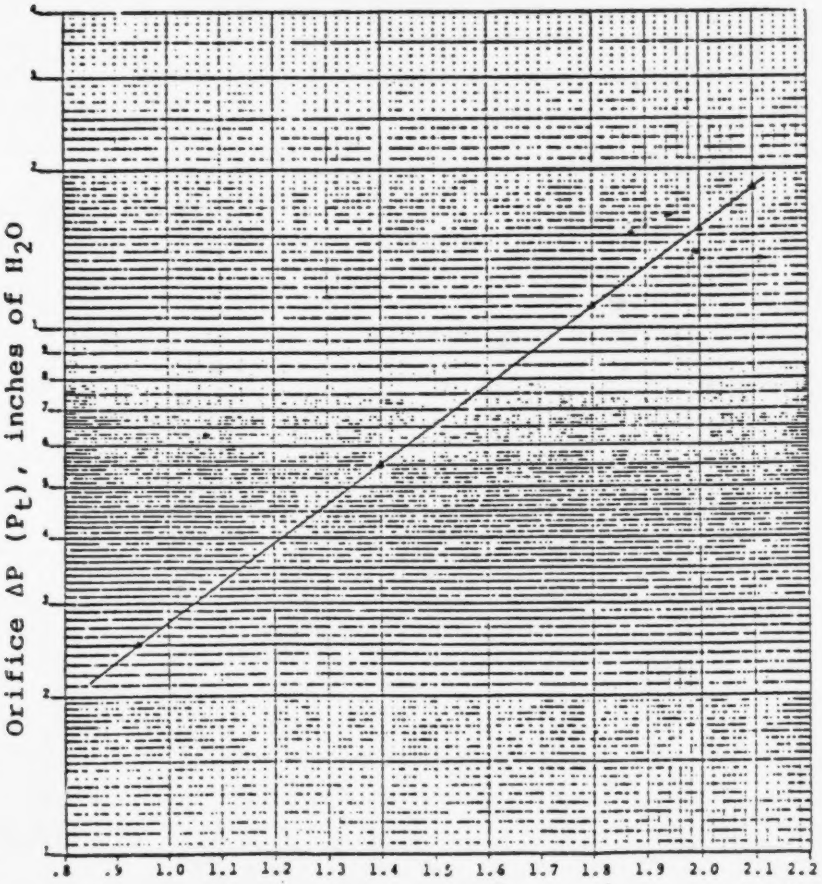

Figure 2.7 Example of hi vol orifice calibration relationship

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[a] not to exceed ± 1 percent

STANDARD OPERATING PROCEDURE
HIGH VOLUME TSP FILTER HANDLING AND STORAGE

1. General Discussion

Filters used for High Volume TSP particulate collection are 8" x 10" Sierra glass fiber filters.

Sample ID codes have a two letter prefix, EH for High Volume TSP filters. A three digit number follows the prefix, starting with 001.

All filter handling procedures are to be done in a clean area. Clean the work area with a methanol dampened Kaydry towel, then lay out a clean Kaydry to use as a work surface before all handling procedures.

Filters are stored in individual file folders, which, in turn, are placed inside manila envelopes.

2. Materials and Equipment

- Sierra Model C-305-GF glass fiber filters
- file folders
- manila envelopes
- Kaydry towels
- methanol
- 4-digit number stamp
- Vinyl medical gloves

3. Filter Coding

1. Cut file folders such that they will fit inside 9" x 12" manila envelopes.
2. Place vinyl medical gloves on hands and clean with methanol dampened Kaydry towel.
3. Select filter to be coded and inspect both sides for foreign particles, pin holes, discolorations, or other imperfections. Some particles may be blown off. Discard the filter if defective; otherwise, open cut file folder and place filter inside.
4. Select ID # to be printed on filter using 4-digit number stamp. Stamp ID # on upper right hand corner of top face of filter such that ink will not interfere with sampling area.
5. Close file folder and stamp on upper right hand corner. Stamp manila envelope with same ID # and place file folder with filter inside.

6. Repeat steps 1 - 5 as necessary.

7. Record ID # and lot number of all filters coded in the RDDP sample log book.

8. Place loaded filters in sample storage cabinet.

STANDARD OPERATING PROCEDURE
MAINTENANCE FOR SIERRA DICHOTOMOUS SAMPLERS

1. Maintenance Schedule

Maintenance will be performed on a monthly basis.

2. Cleaning the Sampling Module

1. Particulate Deposits

The Sampling Module is disassembled as shown in Figure 1. All parts are sealed with "O" rings. Particulate internal loss deposits accumulate primarily on the outer and inner surfaces of the tip of the receiving tube in the virtual impactor head. (Figure 2) The remaining internal surfaces may have slight particulate deposits. These deposits should be cleaned with alcohol or water using a camel's hair brush.

2. Bug Screen

The bug screen is exposed for cleaning by disassembling the aerosol inlet. Brush all loose material off the bug screen and out of the aerosol inlet.

3. "O" Rings

The "O" rings in the aerosol inlet and the flow splitting chambers should be conditioned with a light coating of vacuum grease.

3. Battery Replacement

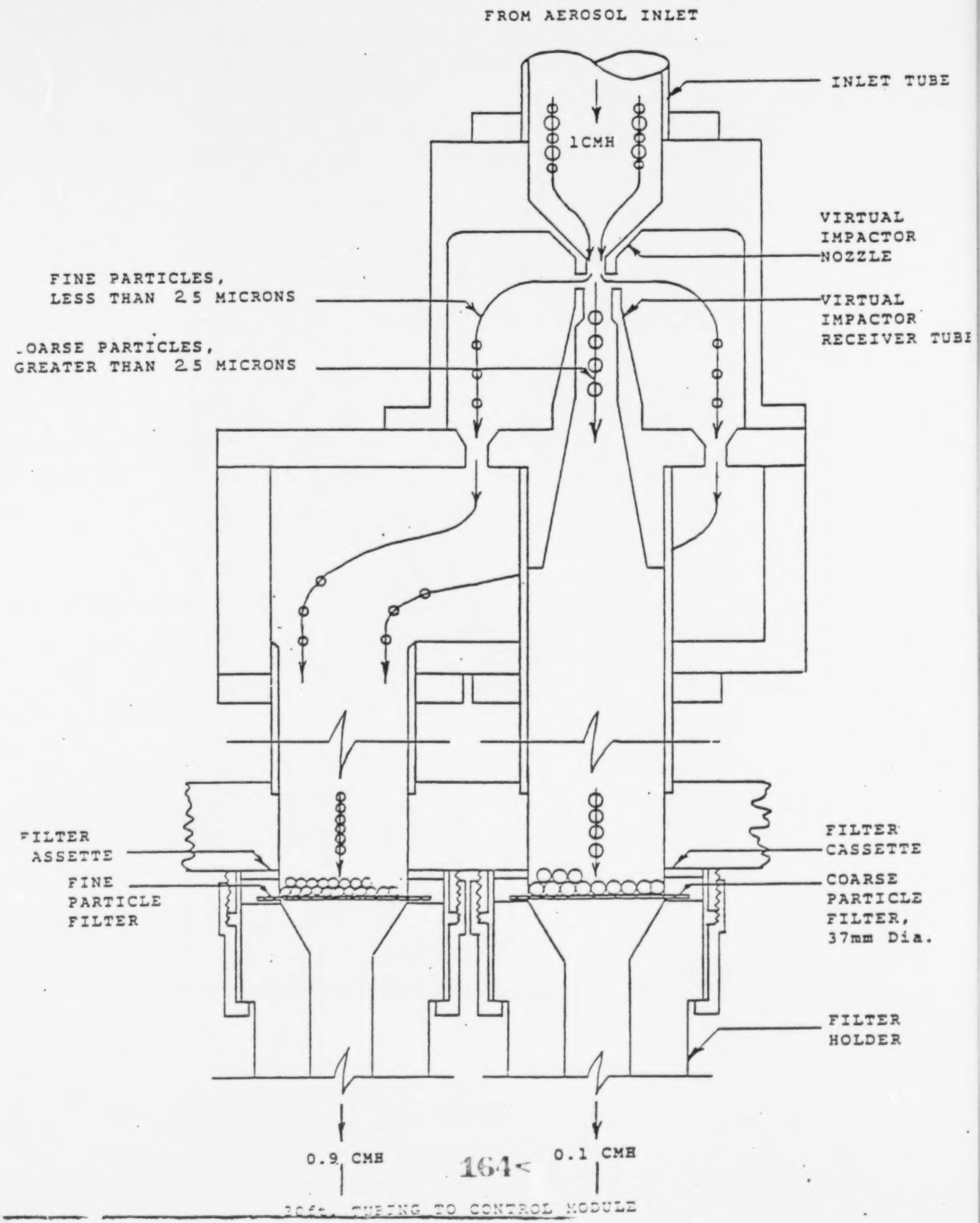
If AC power has not failed during operation, the dry cell battery for stand-by power need be replaced only every 2-3 years. If AC power has failed during operation, as indicated by the dot light on the Timer Module, the battery must be replaced at the next regularly scheduled maintenance.

To replace the battery, unplug the line power cord, and remove the front panel of the Control Module by removing the six screws. The battery is located in a bracket on the lower left hand side of the back wall of the enclosure.

4. Leak Testing

The Control Module is leak-checked by installing needle valves on the coarse-and fine-particle bulkhead fittings on the side of the enclosure. Close the valves and turn on the pump. Pressures P_3 and P_4 on the vacuum gages should be -24 to -25 in. Hg if leaks are negligible. Then gently close the flow selector valve for the total flow and quickly shut off the pump. Important Note: If the pump is allowed to run with the total flow selector valve shut, the pump will act as a compressor and can cause leaks. If leaks are negligible, these pressures will increase to about -12 to -15 in. Hg in approximately 20-30 seconds and then will increase to zero in about 2 minutes. The initial increase to -12 to -15 in. Hg is not caused by external leaks but rather by a small flow through the pnuematic feed-back line from the compressor to the vacuum side of the system.

If leaks exist, they most probably are in the filter jars, which should be tightened firmly. The next leak possibility is the tubing fittings or a tube improperly in contact with the hot pump and has melted through. Most leaks can be quickly isolated by use of the inlet valves and the two vacuum gauges.


FROM AEROSOL INLET
INLET TUBE
1CMH
VIRTUAL IMPACTOR NOZZLE
FINE PARTICLES, LESS THAN 2.5 MICRONS
VIRTUAL IMPACTOR RECEIVER TUB
OARSE PARTICLES, GREATER THAN 2.5 MICRONS
FILTER ASSETTE
FILTER CASSETTE
FINE PARTICLE FILTER
COARSE PARTICLE FILTER, 37mm Dia.
FILTER HOLDER
0.9 CMH
0.1 CMH
30ft. TUBING TO CONTROL MODULE

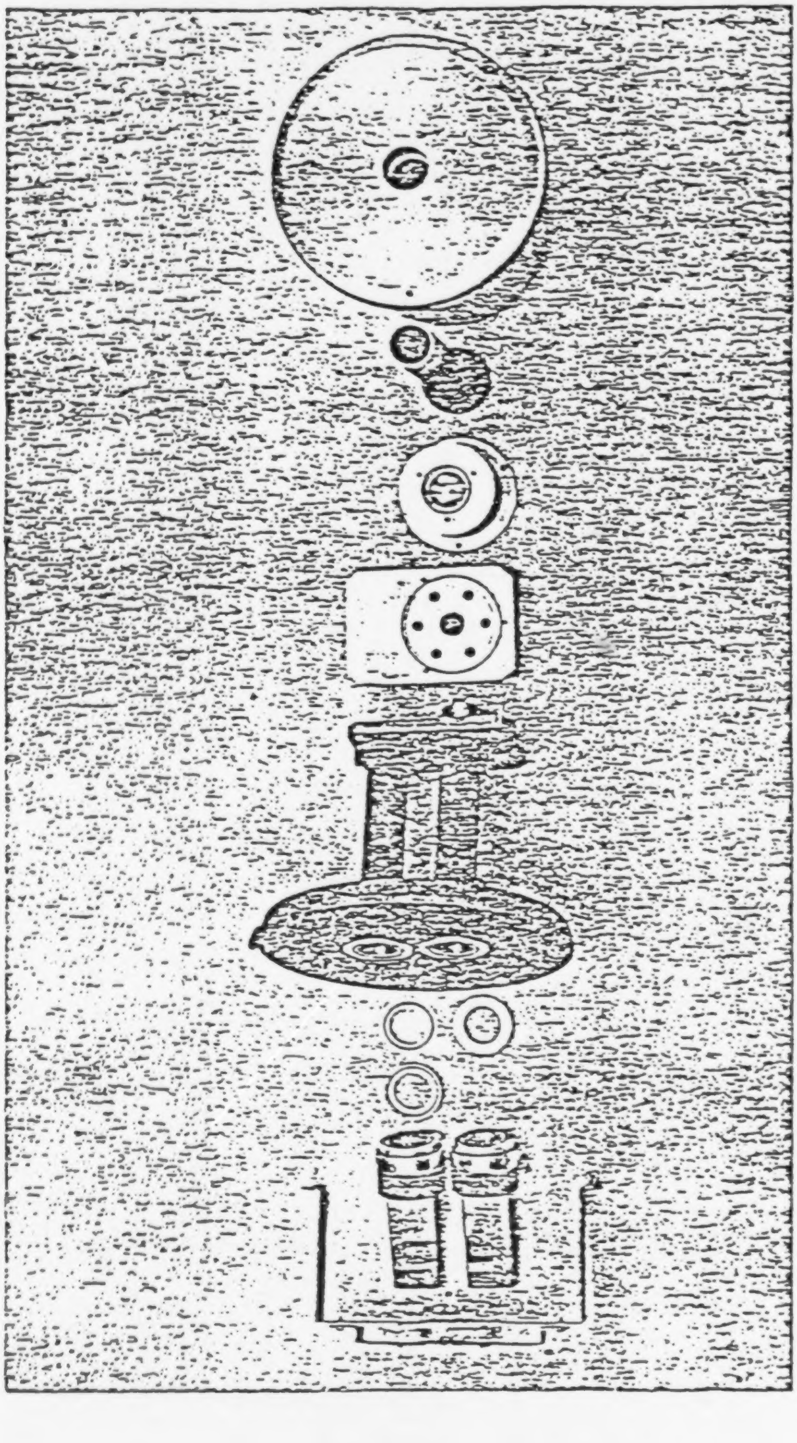


FIG. 1

HI VOLUME - GLASS FIBER FILTER WEIGHING USING THE TORBAL EA-1 AP ANALYTICAL BALANCE

Standard Operating Procedure

1. General Discussion

    1. Analytical Problem:

        The mass of air particulates collected on glass fiber filters must be determined to an accuracy of better than ± 10% relative. Minimum net weight is expected to be about 25 mg.

    2. Interferences:

        Humidity changes may affect the weight of the filter and of the deposit. Filters are equilibrated before and after sampling inside a Constant Humidity Chamber (CHC) 24 hours prior to weighing.

    3. Readability: 0.1 mg.

    4. Precision and Accuracy:

        The balance is calibrated with class S weight. Precision expressed as standard deviation is 0.2 mg.

    5. The technician should read the Torbal EA-1-AP Instruction Manual entirely before using the balance, paying close attention to section 3, "weighing procedure". The balance is always left ON to provide maximum stability.

    6. Every tenth filter is a control filter and is labelled accordingly.

    7. Keep the calibration weight clean and store in its proper container. Handle the calibration weight with the cleaned weight forceps only (non-serrated stainless steel) and do not use the weight forceps for any other job.

(Rev. 6/11/81)

2. Equipment and Materials

- Torbal EA-1 AP Analytical balance with easel
- Constant Humidity Chamber
- Calibration weight, Class S
- Calibration weight forceps
- Kaydry towels
- Kimwipes
- Vinyl medical gloves
- Methanol

3. Operating Procedure

3.1 Start Up:

1. Remove filters to be weighed from their manila envelopes. Place file folder with filter inside into the constant humidity chamber. Allow 24 hours to equilibrate before weighing.
2. Remove hi-vol filter easel from weighing chamber. Plance vinyl medical gloves on both hands. With methanol dampened Kaydry towel, clean: weighing chamber, easel, tare weight, balance control knobs, left front corner of CHC and hands.
3. Replace easel to weighing chamber. Clean area around balance and lay out a clean Kaydry towel on table. Clean forceps using a methanol dampened Kimwipe.
4. Record technician, date, CHC humidity, room humidity and filter ID's on "hi volume weigh sheet". Record whether the filters to be weighed are unexposed or exposed samples.
5. Set weight control knobs and counter control knob to zero. Use the coarse tare control and zero adjust knob to bring null indicator to center.
6. Open door and place the calibration weight on easel. Close door and adjust weight control knobs such that null indicator reads zero. Record the total weight in the "calib" boxes provided by the data sheet. Open door and remove calibration weight from easel to appropriate container.
7. Adjust weight control knobs to zero. Null indicator should read zero; if not, repeat steps 5-7. When null indicator complies with this stipulation, check the box to the right of the first filters ID #.

3.2 Weighing Filters:

1. Remove the first filter to be weighed from the CHC and check to make sure that its ID # corresponds to the ID # on the data sheet. Place filter on easel inside weighing chamber and weigh within 30 seconds. Record weight and note any defects (torn, particles falling off, etc.) on the data sheet. Remove filter from easel and replace inside CHC.
2. Remove another filter, following the same procedure as described above.
3. After every other filter, the balance must be zeroed. Note any large deviations from the null zero in comments column.
4. Repeat steps 1-3 until weighing of the set is complete.
5. Place calibration weight on easel and record the calibration weight.
6. Place calibration and tare weight in their proper containers.

3.3 Reweights:

1. Select at random three filters to be reweighed, preferably by another technician.
2. Use the same start-up and filter weighing procedures with one difference, filters from up to four sets can be reweighed at the same time.

3.4 Calculations:

$$W_n = (W_g - W_t - \Delta C) \times 1000$$

Where: W_n = net deposit in mg

W_g = gross weight in g

W_t = tare weight in g

$$\Delta C = \frac{\sum_{i=1}^{n} (\text{Gross weight Control}_i - \text{Tare weight Control}_i}{n}$$

Where: n = the number of control filters in weigh set.

1. Record W_n in the comments column of the appropriate field data sheet.

3.5 Quality Control:

1. The calibration weight check at the end of a weighing set must be within ± . 0002 g of their correct values or the entire set must be reweighed.
2. The reweight must all be within ± .0010 g or the entire set must be reweighed.

Standard Operating Procedure

EPA High Volume TSP Sampler Audit

8.0 AUDITING PROCEDURE

Audit, as used here, implies an independent assessment of the quality of data obtained by the ambient air monitoring methods. Independence can be achieved by having the audit made by a different operator/analyst than the one conducting the routine field measurements. The audit should be a true assessment of the measurement process under normal operation, i.e., without any special preparation or adjustment of the system. Routine quality assurance checks conducted by the operator/analyst are necessary for obtaining and reporting good quality data, but they are not to be considered as part of the auditing procedure.

Two types of audits are recommended herein, performance and system audits. Four performance audits and a systems audit are described in detail in the following sections. An alternative to performing four individual audits is to audit the entire measurement process by comparing the final results from the field sampler to those obtained with a collocated sampler. This alternative is described in Section 8.2. A summary of these audits is given in Table 8.2 at the end of this section. A systems audit is described in Section 8.3.

Proper implementation and conduct of an auditing program will serve a two-fold purpose: (1) to screen the data, by lots of say N = 50 to 100 measurements of concentration of TSP to detect whether the data quality is adequate, and (2) to estimate data quality in terms of the precision and accuracy. Appendices G and I in Volume I of this Handbook[4] contain information for the auditing and sampling procedures presented in this section and techniques for estimating precision and accuracy of the data.

8.1 Performance Audits

Performance audits are independent assessments made by another operator/analyst to evaluate the quality of data produced by the total measurement system (sample collection, sample analysis, and data processing). Performance audits are normally a quantitative appraisal of quality.

Four performance audits of individual variables are recommended:

1. Audit of clean filter weighing.
2. Audit of flow rate calibration.
3. Audit of exposed filter weighing.
4. Audit of data processing.

An auditing level of 7 out of 100 sampling periods is suggested here as a starting frequency. For the case where one sample is collected every sixth day, an auditing level of one per month is recommended. This would result in an auditing level of approximately 3 for a lot size of 15 for data reported quarterly. If the number of sampling periods is greater than 15 but less than 50, four (4) audits are recommended. These frequencies are suggested starting frequencies and they are to be altered based on experience and data quality. The audit frequency should be reduced if past experience indicates the data are of good quality, or increased if data are of poor quality. In determining the number of audits to be made for a large lot size, it is more important to make sure that the sample is representative of the various conditions that may influence data quality than to adhere to a fixed frequency. The supervisor/quality assurance coordinator will specify the audits and auditing level to be used according to monitoring requirements.

8.1.1 Clean Filter Weighing Audits - Weighing audits are made as soon as practical before or after the regular weighing. Clean filters are normally weighed in batches. This allows for the sampling to be performed and corrections to be made before the filters are used.

1. Divide into lot sizes of 100 or less and weigh.
2. Randomly select and reweigh 7 filters from each lot of 100. See Appendix I of Volume I of this Handbook for

recommending sampling procedures.[4]

3. If any one of the 7 check weights differs more than 2.8 mg from the original weight, reweigh all the filters in that lot. Record results in a laboratory log book.

8.1.2 Flow Rate Calibration Audits - Independent flow rate calibration audits should be made on site. Portable audit equipment is used.[a] Perform the flow rate calibration audits according to the following procedure:

1. Set up equipment.
2. Select one of the resistance plates and obtain the actual flow rate, Q_a, and the rotameter reading, following the calibration procedures, Section 2.6.
3. Convert rotameter reading to flow rate, Q_m, using the calibration curve and making corrections for ambient temperature and pressure.
4. Compute the percent accuracy

$$\% A = \frac{Q_m - Q_a}{Q_a} \times 100. \qquad \text{Equation 8-1}$$

5. If the percent accuracy is greater than ± 7 percent for any one check, a complete recalibration should be performed before sampling is resumed.
6. Report Q_m, Q_a, and the percent accuracy, % A, on an $\overline{X}$ and R chart, under measurement result, items 1 and 2. Record % A in the cells preceded by "Range, R" as indicated in Figure 8.1. The value, % A, can be positive or negative and the range is always positive. The sign of the difference should be retained to determine the existence of trends and/or consistent biases. The steps involved in the construction of a quality control chart and in the interpretation of the results are described in Appendix H, Volume I of this Handbook.[4]

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[a] US EPA uses a reference flow device (called an ReF device) which is an orifice (with 5 different orifice plates) that mount onto the faceplate of the hi vol adaptor. An ReF device may be purchased from Dexco Co., Inc., 630 Chapel Hill Blvd., Burlington, NC 27215.

X̄ and R CHART

PROJECT NAME Flowrate calibration audit

MEASUREMENT PERFORMED %A = 100($Q_m - Q_a$)/Q_a % accuracy in routine and audited measurements

MEASUREMENT UNITS Q_m, Q_a in cfm; %A

DATE 1975			2/4	2/26	3/10	3/25	4/7	4/22	5/6	5/29	6/19	6/30	
MEASUREMENT	CODE	1											
		2											
		3											
Q_m - MEASUREMENT	RESULT	1	60	55	54	54	58	60	56	50	53	56	Q_m
Q_a -		2	59	53	55	56	59	59	54	55	55	56	Q_a
		3											
SUM													
AVERAGE, X̄													
%A ~~RANGE, R~~			1.7	3.8	-1.8	-3.6	-1.7	1.7	3.7	-9.1	-36	0	

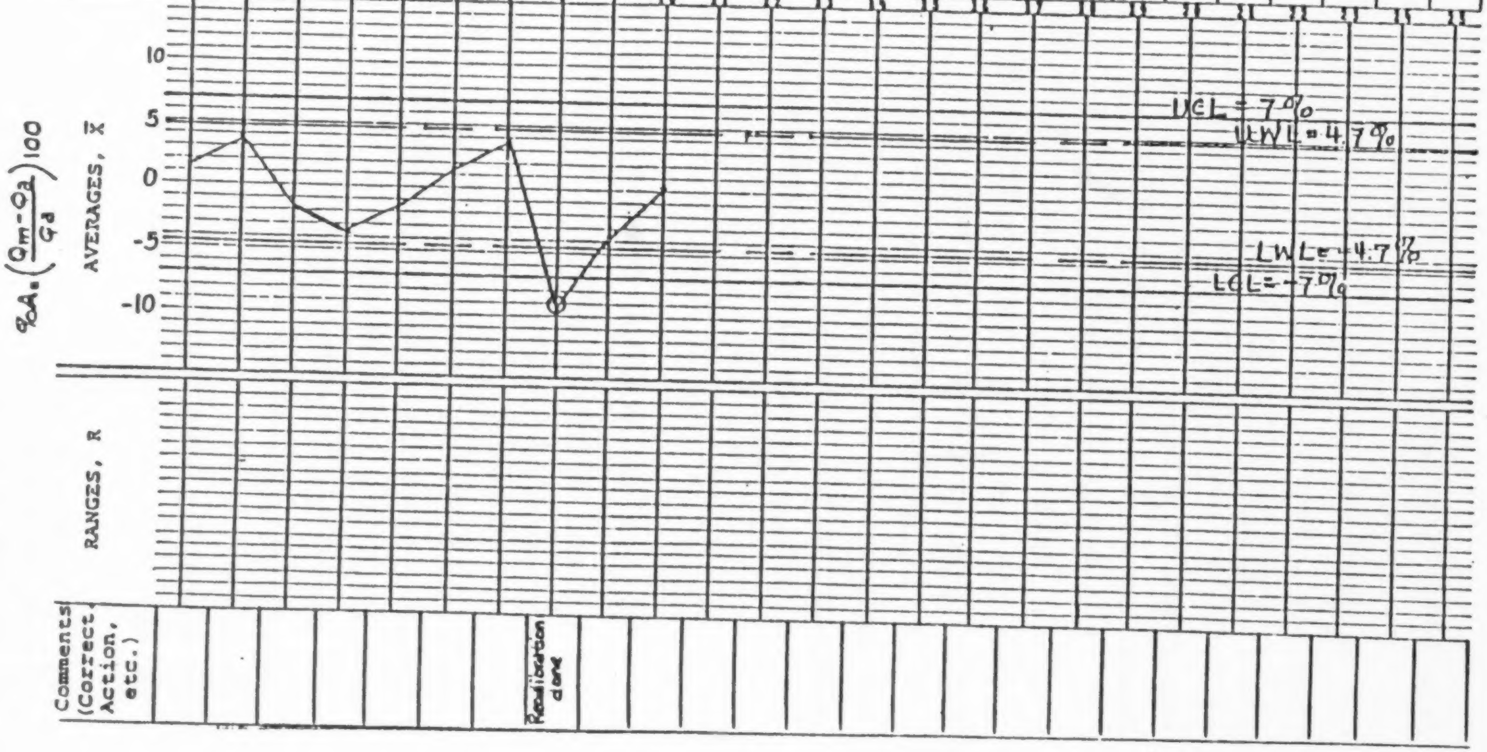


Figure 8.1 Quality control chart for flow rate calibration audit

7. Repeat the above for each flow rate calibration audit plotting all points on the chart and connecting the points by a straight line.

8. Tentative warning and control lines are given as ± 4.7 percent (warning lines) and ± 7 percent ("out of control" lines). After 15 to 20 points are plotted, new control and warning lines may be derived as described in Appendix H of Volume I of this Handbook.[4]

9. Out of control points are an indication of calibration errors, instrument damage, etc. Recalibrate the sampler prior to further sampling when out of control.

10. Forward the $\overline{X}$ and R chart to the supervisor for review.

8.1.3 Exposed Filter Weighing Audits - In order to allow for possible data corrections, it is necessary to weigh exposed filters immediately after a 24-hour conditioning period. Thus, it may be impossible to have lot sizes greater than 10 or 20.

1. Randomly select and reweigh 4 out of every lot size of 50 or less (this would mean 100 percent checking if 4 or less exposed filters are weighed at one time). For lot sizes of 50 or greater, reweigh 7 from each lot.

2. Reweigh all filters in a lot if any audit weight differs by more than ± 5.0 mg from the original weight.

3. Accept the lot with no change if all audits are within ± 5.0 mg of the originals.

4. Record the original and audit weights on an $\overline{X}$ and R chart as illustrated in Figure 8.2. Follow the procedure outlined in steps 6 through 10 in Section 8.1.2. The accuracy A, in this case would be defined as

$$A = \text{Original Weight} - \text{Audit Weight (mg)}. \quad \text{Equation 8-2}$$

Tentative warning and control limits of ± 3.3 mg and ± 5.0 mg, respectively, are recommended until sufficient data are obtained

Table 7.1 ACTIVITY MATRIX FOR MAINTENANCE

Equipment	Acceptance limits	Frequency and method of measurement	Action if requirements not met
Sampler motor	-400 hours operation of motor brushes -Absence of malfunction	Visually check upon receipt and after each 400 hours of operation	-Replace motor brushes -Other maintenance as indicated
Faceplate gasket	Absence of leaks at filter seal	Visually check after each sampling period	Replace gasket
Rotameter	-Absence of foreign materials -Stable operations	Visually check for each sample	Clean; replace if damaged
Motor gaskets	Leak tight fit	Visually check each 400 hours of operation	Replace gaskets
Sampling head	Absence of leaks	Visually check each 200 hours of operation	Replace sampling head

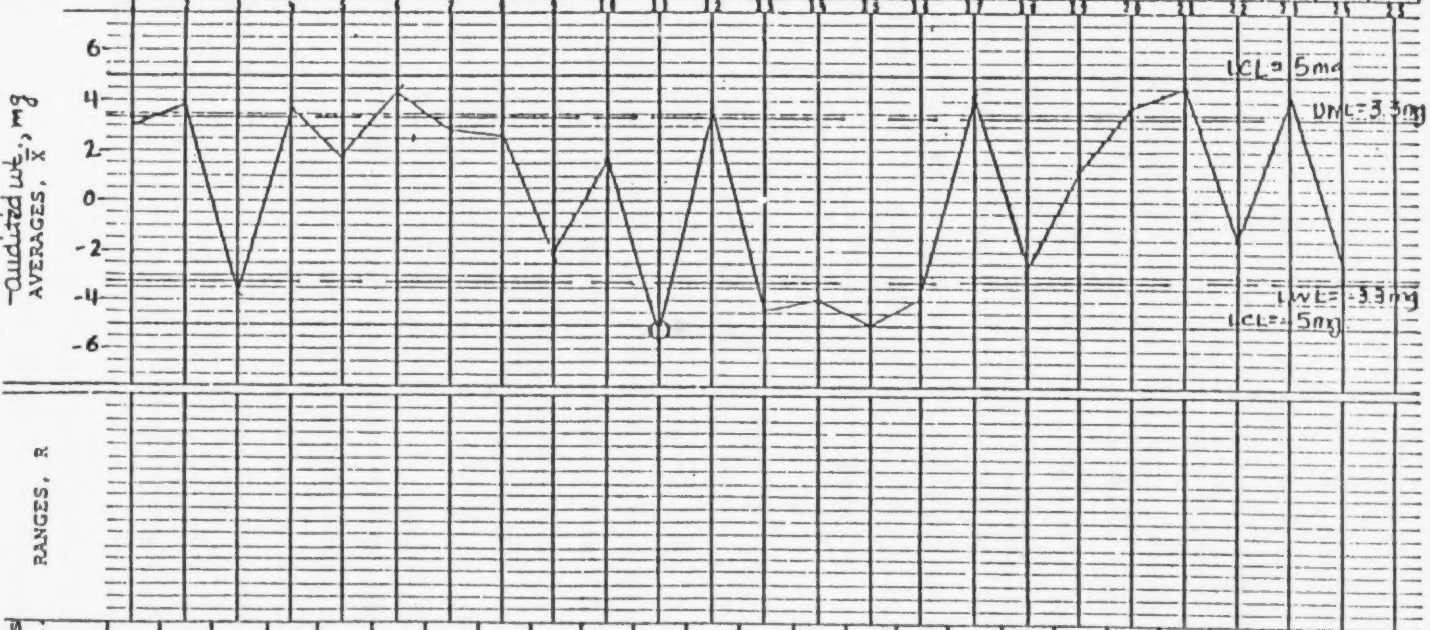
$\bar{X}$ and R CHART

PROJECT NAME Audits of weights of exposed filters

MEASUREMENT PERFORMED A = routinely measured weight − audited weight (mg)

MEASUREMENT UNITS mg

		1/1	1/8	1/15	1/22	1/29	2/5	2/12	2/19	2/26	3/4	3/11	3/18	3/25	4/1	4/8	4/15	4/22	4/29	5/6	5/13	5/20	5/27	6/3	6/10	
DATE '76																										
MEASUREMENT CODE	1	Lot	1 —						→	Lot	2 —						→	Lot	3 —							→
	2																									
	3																									
MEASUREMENT RESULT — Original weight	1	3911.7	3710.7	3812.9	3144.7	3171.5	3174.0	3267.0	3780.7	3903.0	3786.6	3776.6	4251.7	4089.9	3568.0	3701.8	3962.9	3779.9	4275.4	4225.0	3945.9	3755.1	3912.4	3788.2	4255.1	
Audit weight	2	3915.5	3716.4	3877.7	3141.0	3169.7	3179.6	3264.1	3778.0	3905.1	3785.0	3782.0	4257.3	4094.3	3564.0	3696.9	3966.7	3775.6	4278.2	4223.7	3942.2	3750.6	3913.9	3784.0	4258.2	
	3																									
SUM																										
AVERAGE, $\bar{X}$																										
A ~~RANGE,~~ R		3.2	3.8	-3.8	3.7	1.8	4.4	2.9	2.7	-2.1	1.6	-5.4	3.6	-4.4	4.0	4.9	-3.9	4.3	-2.8	1.3	3.7	4.5	-1.5	4.2	-3.1	



Comments (Correct. Action, etc.): 3/11 — Reweigh all filters in Lot 2

Figure 8.2 Quality control chart for audit of weights of exposed filters

to support an alteration of these limits. Do not increase the limits unless so authorized by the Administrator.

5. Forward the $\overline{X}$ and R chart to the supervisor for review.

6. Out of control points indicate the need for recalibration of the balance and/or improved operator technique. Reweigh all of the remaining exposed filters in the lot.

8.1.4 Data Processing Check - In auditing data processing procedures, it is convenient and allows for correction to be made immediately if audits are made soon after the original calculations have been performed. In particular, this allows for possible retrieval of additional explanatory data from field personnel when necessary.

1. Use the same audit rate as step 1 of 8.1.3.

2. The check is made starting with the raw data on the data sheet or flow rate recorder chart and continuing through the recording of the concentration in $\mu g/m^3$ on the SAROAD form.

3. If the mass concentration of suspended particulates computed by the audit check, $(\mu g\ TSP/m^3)_a$, differs from the original value, $(\mu g\ TSP/m^3)_m$ by as much as ± 3 percent, all samples in that lot are checked and corrected as necessary. The audit value is always given as the correct value under the assumption that a discrepancy between the two values is always double checked by the auditor.

4. Audit values are recorded in the data log and reported, along with the original values, to the supervisor for review.

8.2 Auditing with a Collocated Sampler

An alternate method of auditing the high volume method, which in certain situations might be feasible, is to use two collocated samplers. A network operating several samplers in a reasonably small area (e.g., city or county) might find this method more convenient than auditing individual variables. The field sampler and the audit sampler will be denoted respectively, as the first and second sampler throughout the section.

The second sampler should be operated in strict accordance with the procedures given in this section of the Handbook. A record should be maintained of the checks performed on the second sampler and reported with the data as requested by the manager. An audit would be to place the second sampler adjacent to (but no closer than 6 feet) the field sampler (see Reference 1 for discussion on positioning the sampler) and sample simultaneously.

The percent difference in the concentration of suspended particulates as measured by the field sampler and the second sampler is computed by

$$\text{Percent difference} = \%D = \frac{(\mu g TSP/m^3)_1 - (\mu g TSP/m^3)_2}{0.5\left[(\mu g TSP/m^3)_1 + (\mu g TSP/m^3)_2\right]} \times 100. \quad \text{Equation 8-3}$$

Based on the results of a collaborative test[1] a defect would be defined as

$$|D| \geq 15.^*$$

The auditing level for collocated samplers would be the same as that given in the previous section, i.e., $n = 7$, $N = 100$ as the initial rate.

Values of $(\mu g\ TSP/m^3)_1$, $(\mu g\ TSP/m^3)_2$, and D, and the auditing level would be reported on the quality control $\overline{X}$ and R chart along with standard identification information.

The data may be analyzed and reported as described in steps 6 through 10 of Section 8.1.2, above, with the exception that the difference, D, is obtained by equation 8-3. Tentative warning and control limits are given as 10.0 and 15.0 percent respectively. Out of control values may imply errors in any one of the several sample collection and analysis steps. Audits of specific steps will aid in determining the likely cause of the large deviations, e.g. calibration, weighing, and/or data processing errors. See Figure 8.3 for an example quality control chart.

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*If $\sigma = 3.5$ percent of the concentration of TSP for each sampler, then the percent difference, D, would have a standard deviation of 5.0 percent of the mean value. This gives a 3σ value of 15 percent.

8.3 Systems Audit

A systems audit is an on-site inspection and review of the quality assurance system used for the total measurement system (sample collection, sample analysis, data processing, etc.). System audits are normally a qualitative appraisal of system quality.

A systems audit should be conducted at the beginning of a new monitoring system and as appropriate thereafter to audit significant changes in system operation.

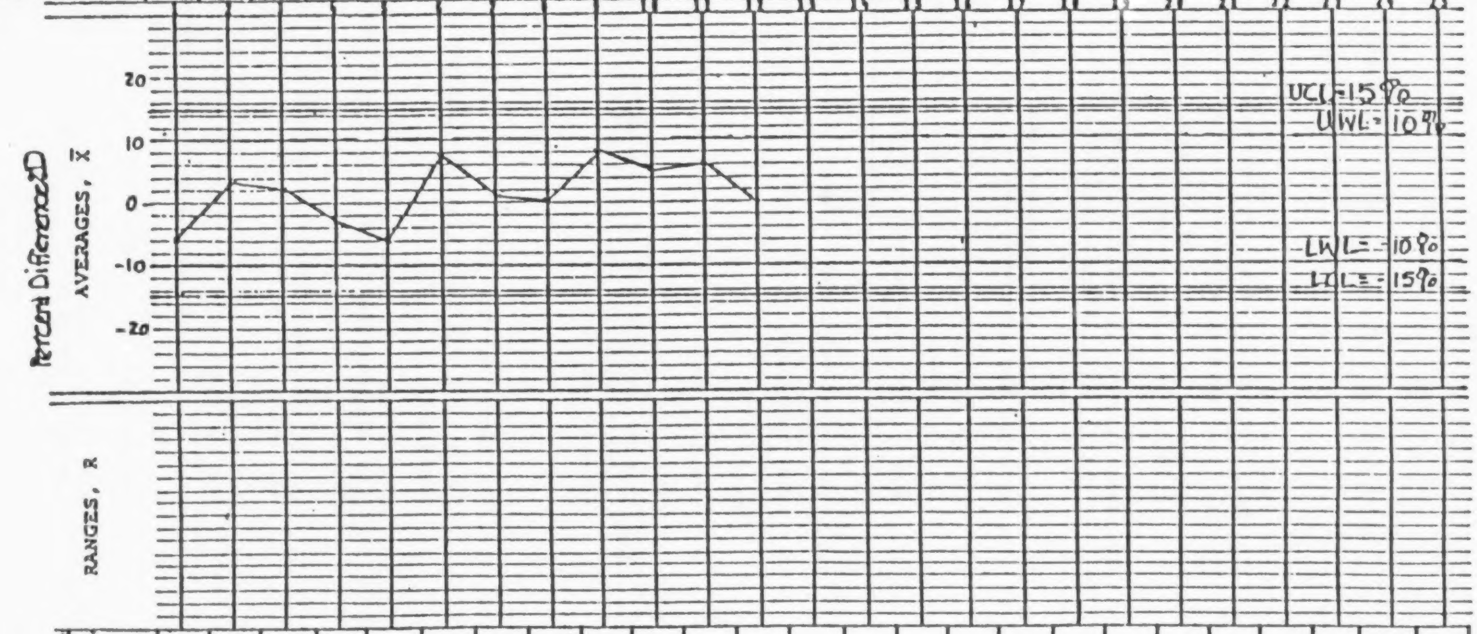
A preliminary form for use in a system audit is given in Table 8.1. These questions should be checked for the applicability to the particular local, state, or Federal agency.

PROJECT NAME Audit with collocated samplers

MEASUREMENT PERFORMED %D = [(ug TSP/m³)₁ - (ug TSP/m³)₂] / average of (ug TSP/m³) 1 and 2

MEASUREMENT UNITS Percent difference

DATE		'76	1/1	1/8	1/15	1/22	1/29	2/5	2/12	2/19	2/26	3/4	3/11	3/18													
MEASUREMENT	CODE	1	Lot	1 →			Lot	2 →			Lot	3 →															
		2																									
		3																									
	RESULT	1	172	69	99	55	148	161	95	121	142	132	154	45													
		2	182	67	96	57	158	150	94	121	131	125	145	45													
		3																									
SUM																											
AVERAGE, X̄			177	68	97	56	153	155	94.5	121	136.5	128.5	149.5	45													
%D RANGE, R			-6	3	2	-3	-6	7	1	0	8	5	6	0													



Comments (Correct. Action, etc.)

Figure 8.3 Quality control chart for audit with collocated samplers

Table 8.1 CHECK LIST FOR USE BY AUDITOR FOR HI VOL METHOD

1. What type of hi vol samplers are utilized in the network?
   ____

2. How often are the samplers run? (a) daily, (b) once every six days, (c) once every 12 days, (d) other.

3. What type of filter and number is being utilized? __________
   ____

4. Are there any pre-exposure checks for pin holes or imperfections run on the filters? ___

5. What is the collection efficiency for your filters? _________
   ____

6. What is the calibration procedure for the hi vol sampler?
   ____

7. Which statement most closely estimates the frequency of flow rate calibration? (a) once when purchased, (b) once when purchased, then after every sampler modification, or (c) once when purchased, then at regular intervals thereafter.

8. Are flow rates measured before and after sampling period?
   ___

9. If the answer to #8 is yes, using the equation below, what is the estimated average percent of change in the flow rates? Use the equation

   $$\frac{100(Q_i - Q_f)}{Q_i} = \text{percent change}$$

   (a) less than 10%, (b) 10-20%, or (c) greater than 20%.

10. Is there a log book at each sampler to record flows and times? ___

11. Are filters conditioned before initial and final weighings? ___. If so, how long? _________. And at what percent humidity? ___________.

12. Is the balance checked on a periodic basis? ___. If so, how often? With which standard weights? _______________

13. How often are the hi-vol filters weighed? _______________
    How is the data from these weighings handled? __________
    ____

14. Are all weighings and serials numbers of filters kept in a log book at the laboratory? ___

15. What is the approximate time delay between sample collection and final weighing? _____days

Table 8.2 ACTIVITY MATRIX FOR AUDITING PROCEDURE

Audit	Acceptance limits	Frequency and method of measurement	Action if requirements not met
Weighing audits Clean filters Exposed filters	Audit wt. = original wt. ± 2.8 mg Audit wt. = original wt. ± 5.0 mg	Frequency - 7 audits per 100 filters. For a lot size of 50 or less filters make 4 audits. Method - Use analytical balance. Condition filters for 24 hours before weighing	Reweigh all filters in the batch
Calibration audit	$0.93 \leq \frac{\text{Flow rate}_m}{\text{Flow rate}_a} \leq 1.07$ Flow rate_m = routine measured rate Flow rate_a = audited rate	Frequency - See above. Method - Same as for calibration procedure for one flow rate.	Perform calibration before sampling is resumed.
Data processing audit	$0.97 < \frac{(\mu g\ TSP/m^3)_m}{(\mu g\ TSP/m^3)_a} < 1.03$ $(\mu g\ TSP/m^3)_m$ = routine measured concentration $(\mu g\ TSP/m^3)_a$ = audited concentration	Frequency - See above. Method - Redo all calculations; readings of charts, etc. through recording results.	Recheck all calculations.
Collocated sampler audit	$\frac{100[(\mu g\ TSP/m^3)_1 - (\mu g\ TSP/m^3)_2]}{\text{Average } (\mu g\ TSP/m^3)_1 \text{ and }_2} \leq \pm 15\%$, i.e., the difference in concentration does not exceed 15% of the average value obtained by the field sampler 1 and the collocated sampler 2. These limits are for repeatability (same operator). Larger limits would be expected for reproducibility (between two operators).	Frequency - See above. Method - Collocated monitor calibrated and maintained in strict accordance to method description.	Data invalid for sampling period.
Systems audit	Method as described in this section of the Handbook	Frequency - At the beginning of a new monitoring system and periodically as appropriate Method - Observation of procedures and by check list	Initiate improved methods and/or trainin programs

(Rev. 7/14/81)

Dichotomous Filter Handling and Data Procedures

I. General Discussion

Dichotomous filters best suited for the CMB analysis of ambient particulate material consist of a polyolefin supporting ring bonded to the top (particle collection) surface of a teflon membrane. The filters are 37 mm in diameter.

Sample ID codes should consist of a letter prefix indicating the sample site and whether the filter is the fine or coarse fraction. Sequential three digit numbers should then be used for the sample number, e.g., BFSC 012 and BFSF 012 might represent the twelfth sample (both coarse and fine) collected in Bakersfield (B) at the fire station (FS) site. The most important point to emphasize is that both the coarse and fine fraction filters should have the same numerical code to facilitate data interpretation and the letter portion should reflect the sample site and whether it is the coarse or fine fraction (C or F).

Maintain a sample log book. Record sample sites, filter numbers, dates, comments, volumes, weights and filter lot numbers.

All filter handling procedures should be done in a clean area. Clean the work area with a methanol dampened Kaydry towel, then lay out a clean Kaydry towel to use as a work surface before all handling procedures. The filters must be handled only by the supporting ring with clean forceps. A laminar flow clean hood is the most appropriate work area. Disposable plastic gloves should be worn when working with filters.

Petri dishes, slides and cassettes can be reused but must be wiped clean with methanol before reuse.

II. Materials and Equipment

- Sierra Model FH-240-P filter cassettes
- Millipore plastic Petri dishes (PD 10 047 00)
- Millipore plastic Petri slides (PD 15 047 00)
- Ghia Corp. 2μ PTFE 37 mm filters with polyolefin rings (R2P503700)
- field sample transport boxes
- shipping boxes
- forceps
- Kaydry towels (VWR Cat. # 21903-008)
- methanol (polyethylene wash bottle)
- waterproof fine point marker (e.g. Pilot Corp. extra fine point permanent markers)

- adhesive labels
- disposable plastic gloves (e.g., Tru-Touch Vinyl Medical Gloves, VWR cat # 32901-060)
- Tip-n-Tell shipping indicators

III. Laboratory and Field Procedures

1. Lay out a series of 6 - 10 Petri dishes on the work surface, label with the sample ID numbers, recalling that there should be coarse and fine pairs.

2. Select a new filter and inspect both sides for foreign particles, pin holes, discolorations, or other imperfections. Some particles may be carefully blown off. Discard the filter if defective.

3. Steady the filter by pressing down on the plastic ring of the filter with forceps. Write the ID number as recorded on the Petri dish on the plastic ring of the filter using a fine point waterproof marker.

4. Weigh the numbered filter and record in log book. Also record the filter lot number.

5. Place the bottom half (female part) of a clean Sierra filter cassette on the work surface and place the weighed and numbered filter into it. The filter should be placed top (numbered) side up. Place the top half (male part) of the clean Sierra filter cassette in position over the bottom half and press down so that it snaps into proper alignment.

6. Label the edge of the cassette with an adhesive label. The number should correspond to the number on the Petri dish and polyolefin ring.

7. Place the loaded cassettes into the corresponding Petri dishes.

8. Place the Petri dishes into the field transport box (in coarse-fine sets).

9. Once at the sampling site, place the cassettes into the dichotomous samplers (bevelled side down) again making sure that each coarse-fine set is placed into one dichotomous sampler. Retain the numbered Petri dishes in the field transport box.

10. Record the sample site, sampler serial number, filter ID number, start and stop flow rate, start and stop time and volume, as well as the initials of the operator and comments onto data sheets (sample attached). Note: Total (T) flow rate and volume and coarse (c) flow rate and volume are measured and recorded.

11. After a 24 hour sample has been collected, the loaded filter cassette should be placed into its corresponding numbered Petri dish and returned to the laboratory.

12. Label clean Petri dish slides with the sample ID numbers.

13. Select a Petri dish containing an exposed filter from the sample transport box and place on the work surface. Obtain the Petri slide with the matching ID and place on the work surface.

14. Remove the Petri dish lid and, being careful not to touch the filter, remove the filter cassette assembly from the Petri dish. Remove the side label and carefully separate the cassette assembly. Then using a pair of forceps, transfer the filter to its Petri slide.

15. Record any unusual appearance or condition of the filter in the sample log book.

16. Weigh the loaded filter and record the weight in the sample log book. Replace the filter into its numbered Petri slide. Pinch the edge of the filter in the Petri slide when closing the slide to hold the filter in place. Note: Less than 100 Petri slides per tray can be held when they are loaded due to the increased thickness caused by pinching the filter.

17. Place the Petri slides into the plastic trays. Put the cardboard boxes containing the trays into a cabinet or other protected location until enough are collected for shipment.

IV . Shipment

1. Place the cardboard boxes containing the plastic trays of loaded Petri slides into the flanged shipping box in such a manner so that all filters are held upright during shipment. Include filters from each filter lot number for blanks.

2. Photocopy the data sheets and appropriate pages from the sample log book for enclosure into the shipping box. Include the uncorrected mass of particulate material collected on the filters in micrograms.

3. Place a "Tip-n-Tell" indicator on the shipping box with the accompanying label. Activate the "Tip-n-Tell" indicator.

4. Ship directly to NEA Laboratories, Inc., 8310 S.W. Nimbus Avenue, Beaverton, Oregon, 97005.

LOW-VOLUME DICHOTOMOUS FIELD DATA SHEET

Site	Sampler Serial#	Filter ID#	Date Sampled	Flow Rate (l/min)		Time Totalizer (hrs)			Initials	Volume (m^3)	Com
				Start	Stop	Start	Stop	Net			
		F		T						T	
		C		C						C	
		F		T						T	
		C		C						C	
		F		T						T	
		C		C						C	
		F		T						T	
		C		C						C	
		F		T						T	
		C		C						C	
		F		T						T	
		C		C						C	

Soil and Road Dust Sample Sieving

11.1 General Discussion

The bulk soil and road dust samples collected according to SOP #12 and #13 must be segregated before analysis. This procedure describes the isolation of two size fractions, <75 μm and <38 μm.

Special care must be taken to prevent the spread of dust to any other sample handling or analysis area of the lab, and to prevent cross-contamination of the soil samples. Clean the work area and spatulas with methanol dampened Kaydry towels between each sample handling.

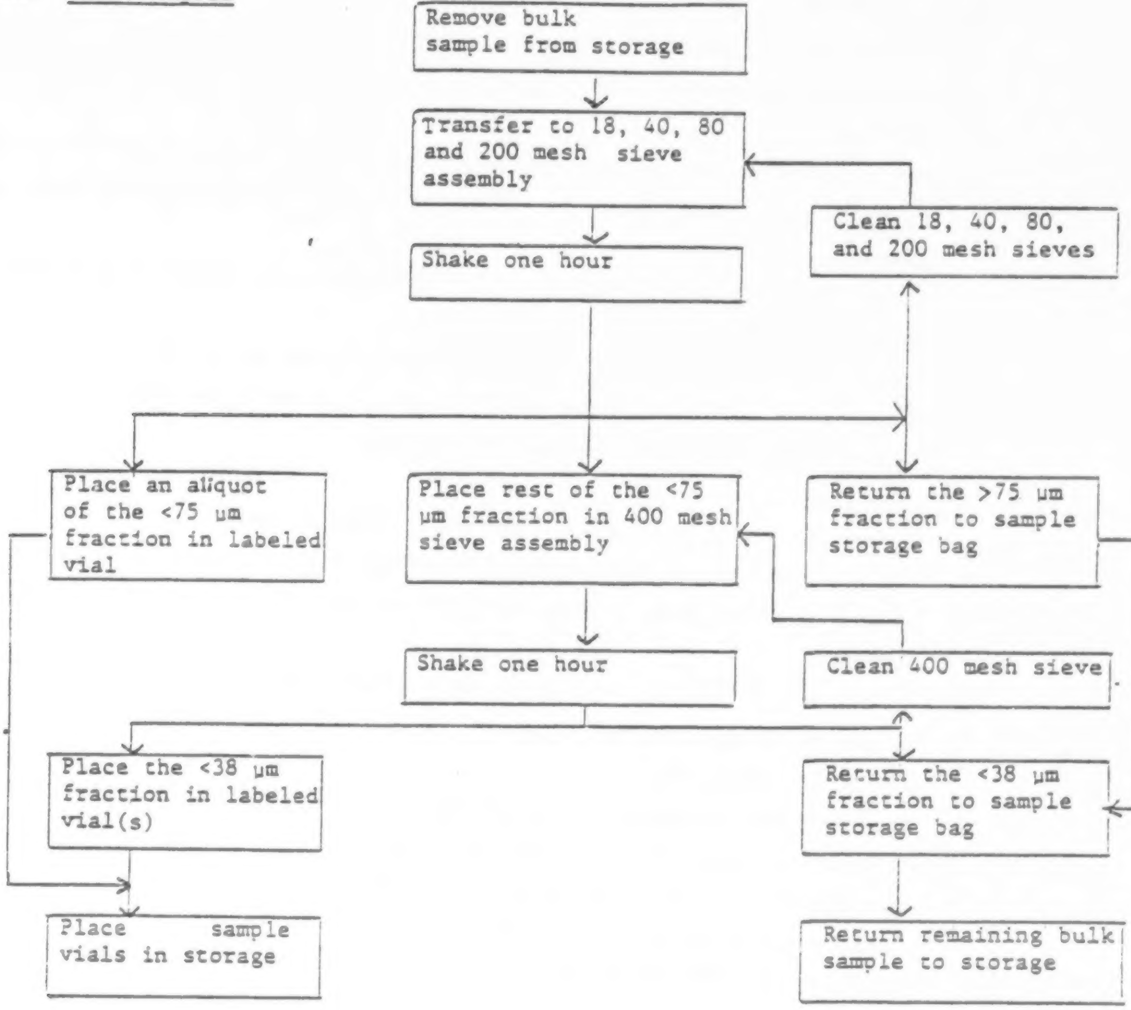
11.2 Materials and Equipment

1. Set of Tyler sieves, as indicated plus top cover and bottom pan.

USA No.	Opening μm
18	1000
40	425
80	180
200	75
400	38

2. Tyler sieve shaker, Model RX-24
3. Polyvials, 26 ml.
4. Kaydry disposable towels.
5. Compressed air.
6. Spatulas, large and small sizes.
7. Methanol.
8. Soft bristle brush.

11.3 Flow Diagram


Remove bulk sample from storage
Transfer to 18, 40, 80 and 200 mesh sieve assembly
Clean 18, 40, 80, and 200 mesh sieves
Shake one hour
Place an aliquot of the <75 µm fraction in labeled vial
Place rest of the <75 µm fraction in 400 mesh sieve assembly
Return the >75 µm fraction to sample storage bag
Shake one hour
Clean 400 mesh sieve
Place the <38 µm fraction in labeled vial(s)
Return the <38 µm fraction to sample storage bag
Place sample vials in storage
Return remaining bulk sample to storage

11.4 Sieve Cleaning

1. This procedure should be done in a room dedicated for sieve cleaning or outside to prevent the spread of dust to sample handling areas of the lab.
2. Use compressed air to blow away all loose dust. Pay particular attention to the screen, the screen-to-frame joint, and overlapping surfaces on the frame.
3. Carefully brush all loose dust from the wire mesh screen with a soft bristled brush.
4. Wipe all loose dirt from the frame with a brush or Kaydry towel. Clean both inside and outside and below as well as above the screen.
5. Repeat steps 2-4 until the sieve is clean.

11.5 Sieving

1. Clean the bottom pan using a methanol dampened Kaydry towel and assemble the cleaned Tyler sieves in the following order, from the bottom to top: bottom pan, 200 mesh screen, 80 mesh screen, 40 mesh screen, 18 mesh screen.
2. Select a sample from the sample storage cabinet for processing.
3. Remove the inner bag and sample data card from the outer bag. Set them aside for later use.
4. Transfer the contents of the sample bag to the sieve assembly; minimize the loss of fine dust by dumping the sample into the sieve slowly and carefully. Set the sample bag aside for later use.
5. Clean the top cover using a methanol dampened Kaydry towel and compressed air, and put the top cover into position on the sieve assembly.
6. Place the sieve assembly into position on the shaker. Press the locking tab down firmly onto the sieve assembly with one hand and tighten the locking tab screw with the other hand. Repeat for the other locking tab.
7. Start the shaker. If dust escapes from the sieve assembly, either the assembly is not mounted tightly enough, or there is foreign material between the mating surfaces of the sieves. Correct and restart if necessary. Using the built-in timer, run the shaker for one hour.
8. While the sample is shaking, clean the sieve(s) not in use according to the procedure in section 11.4.

9. Remove the sieve assembly from the shaker and set on a clean Kaydry towel. Remove the sieves and top cover as a unit from the bottom pan and set on a clean Kaydry towel.
10. Using a clean spatula, transfer dust from the bottom pan to a new 26 ml Polyvial. Fill the Polyvial about half full. Close the lid and cut off the hinge. Recore "I.D._________" (from the sample data card) and "size <75 μm" on an adhesive label. Stick the label on the Polyvial and secure in place with a piece of transparent tape.
11. Place the clean 400 mesh sieve on a clean Kaydry towel. Carefully pour the sample remaining in the bottom pan into the 400 mesh sieve; tapping lightly on the pan will remove most of the material.
12. Transfer the material remaining in the 18, 40, 80 and 200 mesh sieves carefully into the bottom pan; tapping lightly on the sieve frame will remove most of the material.
13. Transfer the material from the bottom pan to the sample bag.
14. Use a methanol dampened Kaydry towel to clean the bottom pan.
15. Place the 400 mesh sieve on the bottom pan and the top cover over the 400 mesh sieve.
16. Repeat steps 6 thru 9.
17. Using a clean spatula, transfer dust from the bottom pan to a new 26 ml Polyvial. Use more than one Polyvial if necessary. Close the lid and cut off the hinge. Record "ID #_________" (from the sample data card) and "Size <38 μm" on an adhesive label. Stick the label on the Polyvial and secure with a piece of transparent tape. Record "ID #_________" and "Vial 1 of 2" or "Vial 3 of 3", etc. on the lids of the Polyvials from both size fractions.
18. Transfer material from the 400 mesh sieve to the bottom pan, and from the bottom pan to the sample bag. Close the bag and seal with tape.
19. Record the date of sieving and initials on the sample data card. Place the inner sample bag and data card into the outer bag.
20. Return bulk sample and Polyvials to sample storage cabinet.

TEFLON FILTER WEIGHING USING THE CAHN 27 ELECTROBALANCE

Standard Operating Procedure

1. General Discussion

1. Analytical Problem:

   The mass of air particles collected on teflon membrane filters must be determined to an accuracy of better than ± 10% relative. Two sizes of filters are used, 37 and 47 mm diameter, with tare weights of about 75 ± 20 mg and 120 ± 20 mg, respectively. Minimum net weight is expected to be about 120 µg.

2. Interferences:

   Electrostatic charge on the filter is one possible source of interference. This is eliminated by use of a beta source charge neutralizer. Humidity changes may affect the weight of deposit, but not the weight of filters, since they are non-hygroscopic. Humidity changes are minimized by performing the weighing procedures in an air conditioned laboratory.

3. Minimum Detectable Quantity: 15 µg (three sigma).

4. Precision and Accuracy:

   The balance is calibrated with class M weights. Repeatability for the immediate reweighing of a filter is ± 1 µg; long term repeatability is ± 5 µg.

5. The technician should read the Cahn 27 Instruction Manual entirely before using the balance, paying close attention to Section 3, Balance Operation. The balance is always left ON to provide maximum stability.

6. Keep the calibration weights clean and store in their proper container. Handle them only with the cleaned weight forceps (non-serrated stainless steel) and do not use the weight forceps for any other job.

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2. Equipment and Materials

- Cahn 27 Electrobalance with custom 60 mm open stirrups
- Po^{210} charge neutralizer
- Calibration weights, 10, 20, 50 and 100 mg Class M
- Tare weights, 20 50 and 100 mg Class C
- weight forceps
- filter forceps
- Kaydry towels
- Kimwipes
- Methanol

3. Operating Procedure

3.1 Start Up:

1. Remove the stirrups from the weighing chamber as in Section 3.1.2 of the Cahn 27 Instruction Manual and set aside on a clean Kimwipe. Clean the weighing chamber with a methanol dampened Kimwipe. Replace the stirrups, one on the A side and one on the TARE side. Place the charge neutralizer in the center of the weighing chamber. Clean the area around the balance and lay out a clean Kaydry towel in front of the weighing chamber. Clean the weight forceps (non-serrated stainless steel) and filter forceps using a methanol dampened Kimwipe.

2. Obtain the calibration weights and the filters to be weighed from the sample storage cabinet.

3. Record technician, date and filter lot number on the data sheet.

4. Determine approximate weight of one of the filters by weighing on the A200 range. Select the 10, 20, 50 and 100 mg calibration weights in combination such that their combined weight equals within + 8 and - 12 mg of the filter weight. (When doing gross weights or reweights, use the same weights as for the tare weighing).

5. Set the balance controls to RANGE: A 20 and RESPONSE: 0. Make sure CALIBRATE, COARSE and FINE ZERO controls are locked. Press TARE twice to untare the balance.

6. Place the selected calibration weights on the A pan and balance with appropriate tare weights on the TARE pan so that the display reads 0 ± 20 mg.

7. When the display stabilizes (after at least 30 seconds), press TARE to zero the balance.

8. Add the 20 mg calibration weight to the A pan (or remove it if already there). Display should read + 20.000 ± 0.001 (or - 20.000 ± 0.001) when it stabilizes. If not, adjust CALIBRATE accordingly.

9. Replace calibration weight and note that 0.000 ± 0.001 is displayed. If not, repeat steps 7 and 8. Record tare weight as the sum of the calibration weights ± display reading, and the calibration reading on the data sheet.

10. Remove calibration weights to their container.

3.2 Weighing Filters:

1. Up to 25 filters per set can be weighed. When weighing the filters, note any defects (torn, particles falling off, etc.) on the data sheet.

2. Place the first filter to be weighed on the charge neutralizer. After a few seconds, transfer the filter to the A platform and place the next filter to be weighed on the charge neutralizer.

3. When the display stabilizes (after at least 30 seconds), record the filter ID number and weight reading including + or - sign on the data sheet.

4. Transfer the filter from the A platform to its container, transfer the filter on the charge neutralizer to the A platform, and place the next filter in sequence on the charge neutralizer.

5. Repeat steps 3 and 4 until weighing of the set is complete.

6. Place the calibration weight(s) on the A pan. Record tare weight as the sum of the calibration weights ± display reading. Press TARE if the reading is not 0.000.

7. Add the 20 mg calibration weight to the A pan (or remove it if already there). Record calibration reading.

8. Place calibration and tare weights in their containers.

3.3 Replicates:

1. Select at random three filters to be reweighed, preferably by another technician.

2. Weigh the filters using the procedures in sections 3.1 and 3.2. Indicate that the weighings are replicates on the data sheet. Filters from up to 8 sets can be reweighed at the same time.

3. Calculate the difference, W_d , between the original and replicate weighings.

3.4 Shutdown:

1. Replace the filters that were weighed in the sample storage cabinet.

2. Clean the balance as in 3.1.1.

3. Record the date of weighing in the appropriate Sample Log Book.

4. Calculate net weights if appropriate.

5. Return the data sheets to the laboratory supervisor.

3.5 Calculations:

$$W_n = (W_g - W_t) \text{ X } 1000,$$

where, W_n = net deposit in μg

W_g = gross weight reading in mg

W_t = tare weight reading in mg

$$W_d = (W_g - W_r) \text{ X } 1000$$

or

$$W_d = (W_t - W_r) \text{ X } 1000,$$

where, W_d = difference between original and replicate weights in μg

W_r = replicate weight reading in mg.

3.6 Quality Control:

1. The tare and calibration weight checks at the end of a weighing set must be within ± 0.004 mg of their correct values or the entire set must be reweighed.

2. Replicate weighing differences, W_d, must be $\leq \pm 10$ μg or $\leq 2\%$ of W_n or the entire set must be reweighed.

3.7 Quality Assurance:

1. Class M weights are used for calibration. According to NBS circular 547, they are "...designed for use as reference standards, for work of the highest precision, and for investigations demanding a high degree of constancy over a period of time."
2. 12% replicates ensure that weighing precision is within limits.
3. Calibration and tare operations are performed before each set of 25 filters and are checked for accuracy after each set.
4. Results of replicate weighings and calibration and tare weight checks are reviewed by the laboratory supervisor. He must initial the data sheet before the data is considered valid.

(Rev. 9/25/81)

Standard Operating Procedure

EPA High Volume TSP Sampler Calibration

1. Elapsed Time Meter

The elapsed time meter (synchronous motor type 60 hertz) should be checked on site or in the laboratory every six months against a timepiece of known accuracy. If the indicator shows any signs of being temperature sensitive, it should be checked on site during each season of the year.

A gain or loss of more than 2 minutes in a 24-hour period warrants an adjustment or replacement of the indicator.

Record results of these checks in the calibration log book.

2. Timer

For those samplers that are equipped with an on-off timer, the timer should be calibrated and adjusted using a calibrated elapsed time meter as the reference. An example of this type calibration procedure is presented below. Figure 2.2 depicts the wiring diagram for use in this calibration.

The timer calibration procedure should be performed on a quarterly basis. Calibration data are recorded in the Timer Calibration Log. See Figure 2.3 for an example. The steps in the calibration procedure are:

1. Plug a correctly wired timer into an electrical outlet.
2. Set the timer to the correct time.
3. Set the ON and OFF time trippers for a 24-hour test period.
4. Plug the test light into one of the output plugs and an elapsed time meter into the other.
5. Check the system by manually operating the switch ON and OFF.

6. Allow the system to operate for the 24-hour test period and determine the elapsed time from the elapsed time meter.

   a. If the elapsed time is 24 hours ± 15 minutes, the timer is acceptable for field use.
   b. If the elapsed time is not 24 hours ± 15 minutes, adjust the tripper switches and repeat the test.

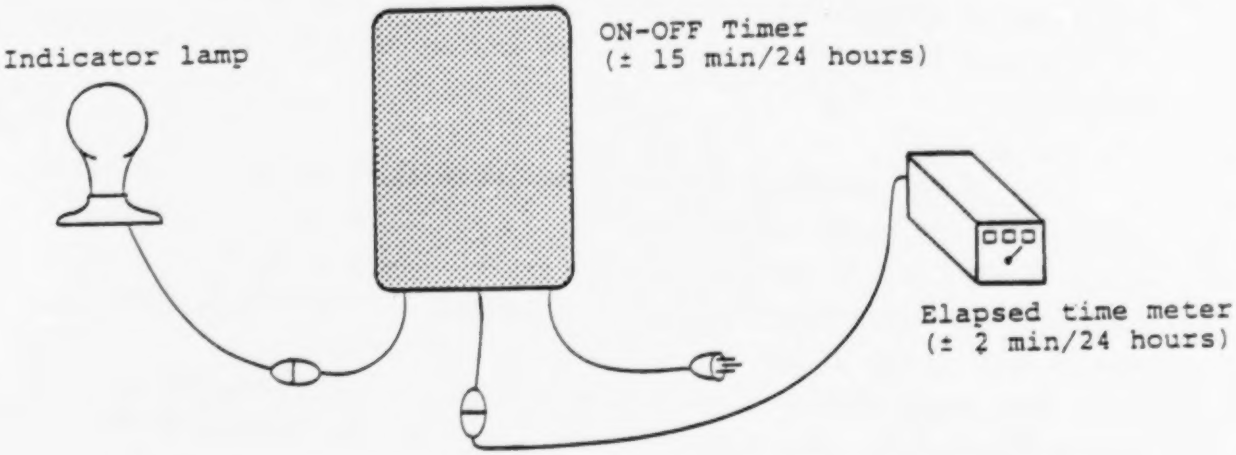

Figure 2.2 Diagram of a timer calibration system

3. Orifice Calibration Unit

The orifice calibration unit should be calibrated against a secondary standard, for example a Rootsmeter, upon receipt and at one-year intervals thereafter. The manufacturer's average calibration curve can be used unless the calibration deviates from it by more than ± 4 percent at any one point along the curve. When deviations from the manufacturer's curve are larger than ± 4 percent and there are no visible signs of damage to the orifice, the calibration should be repeated by another operator. If the large deviations persist (after the secondary standard has been checked

Site location	Timer No.	Date		Elapsed time indicator serial No.	Test period	Elapsed time indicator reading	Accuracy	By (signature)
		Start	Stop					
1141	4321	6/10/75	6/11/75	CW080G	24 hrs.	23 hrs. 53 min.	99.5	C. Jones

Figure 2.3 Example of a timer calibration log

and found satisfactory) a new average calibration curve is constructed using the results from at least five sets of calibration data.

Orifice units should be visually inspected for visible signs of damage to the orifice before each use. A calibration check should be made if the orifice appears to have any nicks or dents.

The following stepwise orifice calibration procedure is adapted from Reference 3.

1. Assemble the parts as shown in Figure 2.4.
2. Zero the water and mercury manometers by sliding their scales until the zero on the scale is level with the meniscus as illustrated in Figure 2.5.
3. Check the level of the positive displacement meter table. Adjust the legs if necessary.
4. Install Load Plate 18 between the orifice and the positive displacement meter.
5. Turn Hi Vol motor ON, and let the system operate 5 minutes. While the unit equilibrates, continue with steps 6-9 below.
6. Write Plate #18 under the Plate # Column in the Hi Vol Orifice Calibration Log. See Figure 2.6 for an example.
7. Record the date, time, orifice number, name of primary standard (positive displacement meter) and the serial number of the primary standard in the appropriate spaces in the log.
8. Record the temperature in °C.

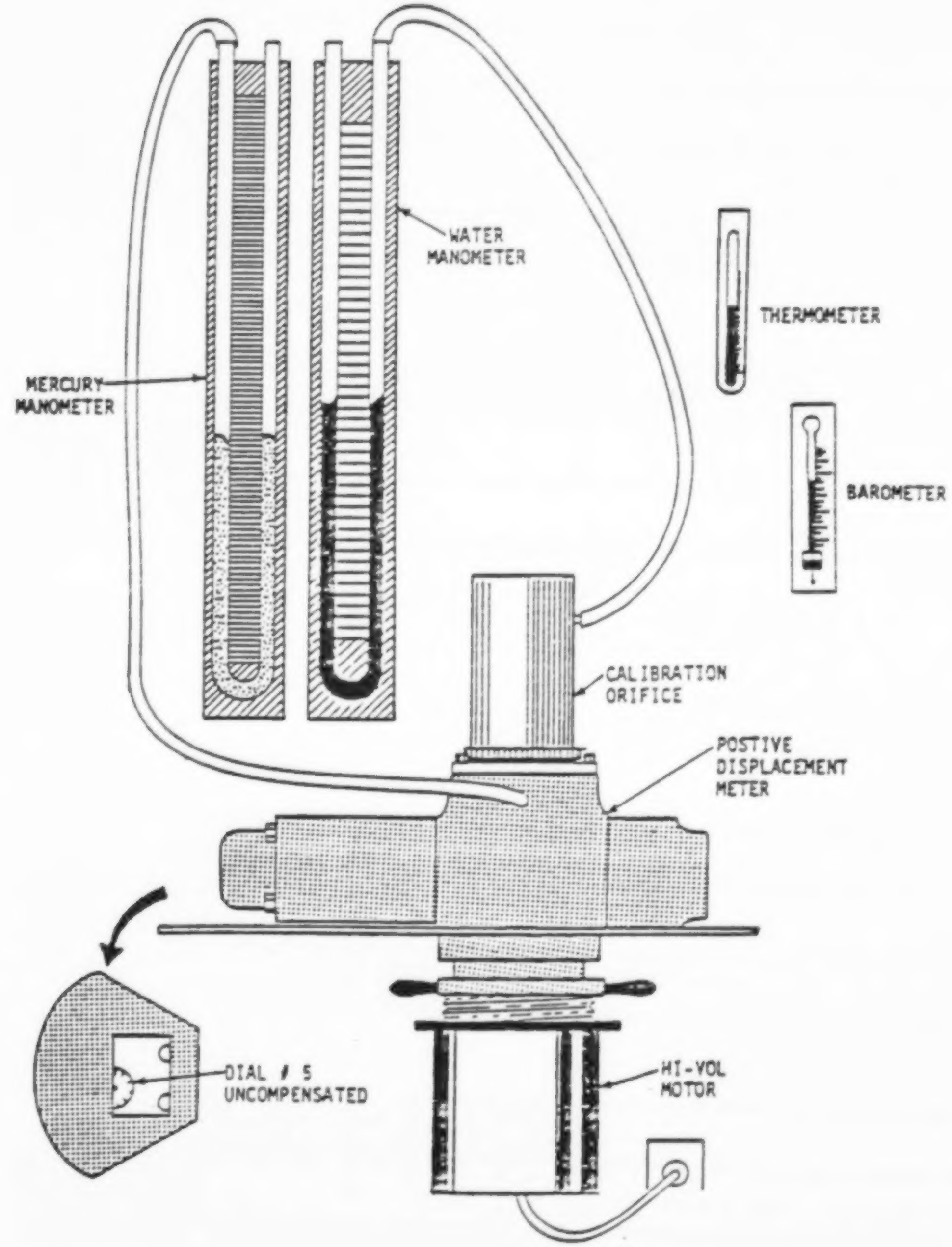
WATER
MANOMETER
THERMOMETER
MERCURY
MANOMETER
BAROMETER
CALIBRATION
ORIFICE
POSTIVE
DISPLACEMENT
METER
DIAL # 5
UNCOMPENSATED
HI-VOL
MOTOR

Figure 2.4 Diagram of positive displacement meter system

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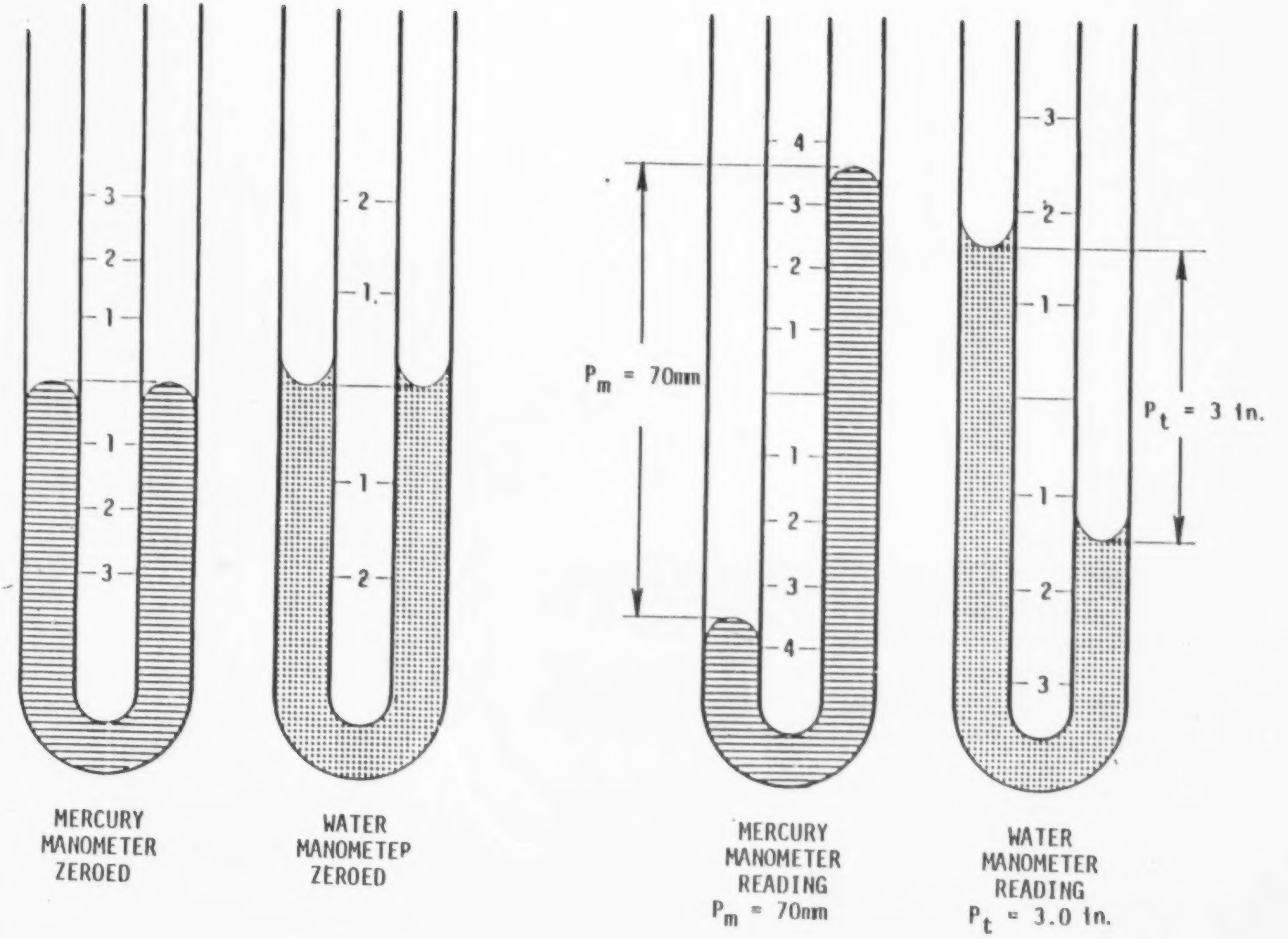
3
2
1
1
2
3
MERCURY MANOMETER ZEROED
2
1
1
2
WATER MANOMETEP ZEROED
4
3
2
1
1
2
3
4
P_m = 70mm
MERCURY MANOMETER READING P_m = 70mm
3
2
1
1
2
3
P_t = 3 in.
WATER MANOMETER READING P_t = 3.0 in.

Figure 2.5 How to read mercury and water manometers

Description Derivation	Ft.^{3} of Air	m^3 of Air	Barometric Pressure mm Hg	Vacuum in Standard in mm Hg	Absolute volume in m^3 $V_m \frac{(P_a - P_m)}{P_a}$	Time in Minutes	Flow rate m^3/min $\frac{V_a}{t}$	Pressure Drop Across the Orifice in inches of water
Symbol / Plate Number	V_c	V_m	P_a	P_m	V_a	t	Q_1	P_t
5	100	2.83	767	70	2.57	2.73	0.94	2.5
7	100	2.83	767	70	2.57	1.84	1.4	5.5
13	100	2.83	767	70	2.57	1.43	1.8	11.0
15	100	2.83	767	70	2.57	1.29	2.0	15.5
18	100	2.83	767	70	2.57	1.22	2.1	18.3
	100	2.83						
	100	2.83						
	100	2.83						
	100	2.83						
	100	2.83						

202

Orifice Number 4861
Manufacturer General Metal Works, Inc.
Temperature 25.0 °C
Barometric Pressure 767
Time 10:45 a.m. EST
Date 6-2-75
Primary Standard Roots Meter
Serial Number 10429
Calibration voltage 130
Signed J.J. Smith
Verified By Jean Young

Figure 2.6 Example of hi vol orifice calibration log

Definitions for use with Figure 2.6

V_a = Actual volume of air measured in cubic meters.

V_c = Volume measured by the positive displacement meter in cubic feet

V_m = Volume measured by the positive displacement meter in cubic meters as calculated from Vc.

P_a = Atmospheric pressure in mm Hg.

P_m = Vacuum at the inlet of the positive displacement meter in mm Hg.

t = Minutes of time elapsed during run.

Q_1 = Flow rate in cubic meters per minute at prevailing atmospheric pressure and temperature (uncorrected).

P_t = Pressure drop across the orifice in inches of water.

Equations given in Figure 2.6

$$V_m = V_c \times 0.0283$$

$$V_a = V_m \frac{(P_a - P_m)}{P_a}$$

$$Q_1 = \frac{V_a}{t}$$

9. Record the barometric pressure in mm Hg.

10. After the 5-minute equilibration period, read the mercury manometer and record this value in column P_m. The example given in Figure 2.5 shows a reading of 70 millimeters (mm).

11. Read the water manometer and record this in column P_t. The example given in Figure 2.5 shows a reading of 3.0 inches.

12. Wind the stopwatch and set it in the horizontal position with the dial facing up.

13. Locate the uncompensated dial on the left end of the positive displacement meter. The location is shown in Figure 2.4. Note: this dial must be viewed from the end. One revolution of Dial #5 equals 10 cubic feet of air passed through the positive displacement meter.

14. Use a stopwatch to measure the time in minutes and hundredths of minutes for exactly 10 revolutions of Dial #5 (i.e., for 100 ft^3 of air to pass through the positive displacement meter). Record 100 under column V_c and the elapsed time under column t.

15. Record 2.83 under column V_m to convert cubic feet to cubic meters.

$$V_m = V_c \times 0.0283$$

$$100 \text{ ft}^3 \times 0.0283 \frac{m^3}{ft^3} = 2.83 \text{ m}^3$$

16. Turn the motor OFF.

17. Repeat this procedure with each of the other load plates in the set.

18. Repeat Steps 1-17 one time.

19. Calculate and record V_a for each run.

$$V_a = V_m \frac{(P_a - P_m)}{P_a}$$

20. Calculate and record Q_1 for each run.

$$Q_1 = \frac{V_a}{t}$$